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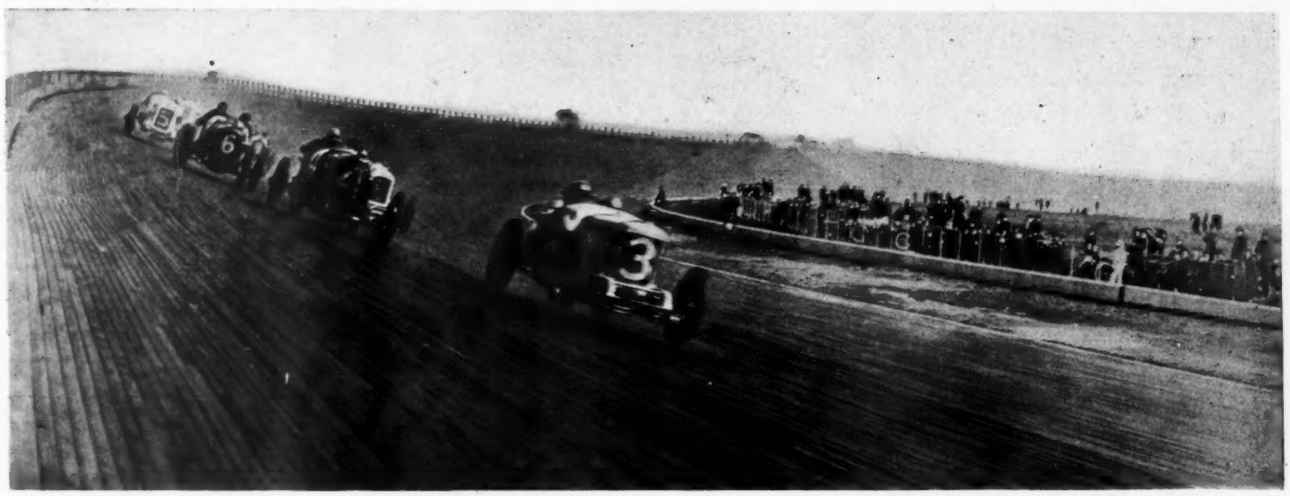
The AUTOMOBILE



Oldfield, Burman, Wilcox, Cooper and Anderson having a breathless brush on the high banked curve

Stutz Triumphs at 102.6 M.P.H.

Anderson Wins Astor Cup—Rooney in Another Stutz Second—America Takes First Five Places

By J. Edward Schipper

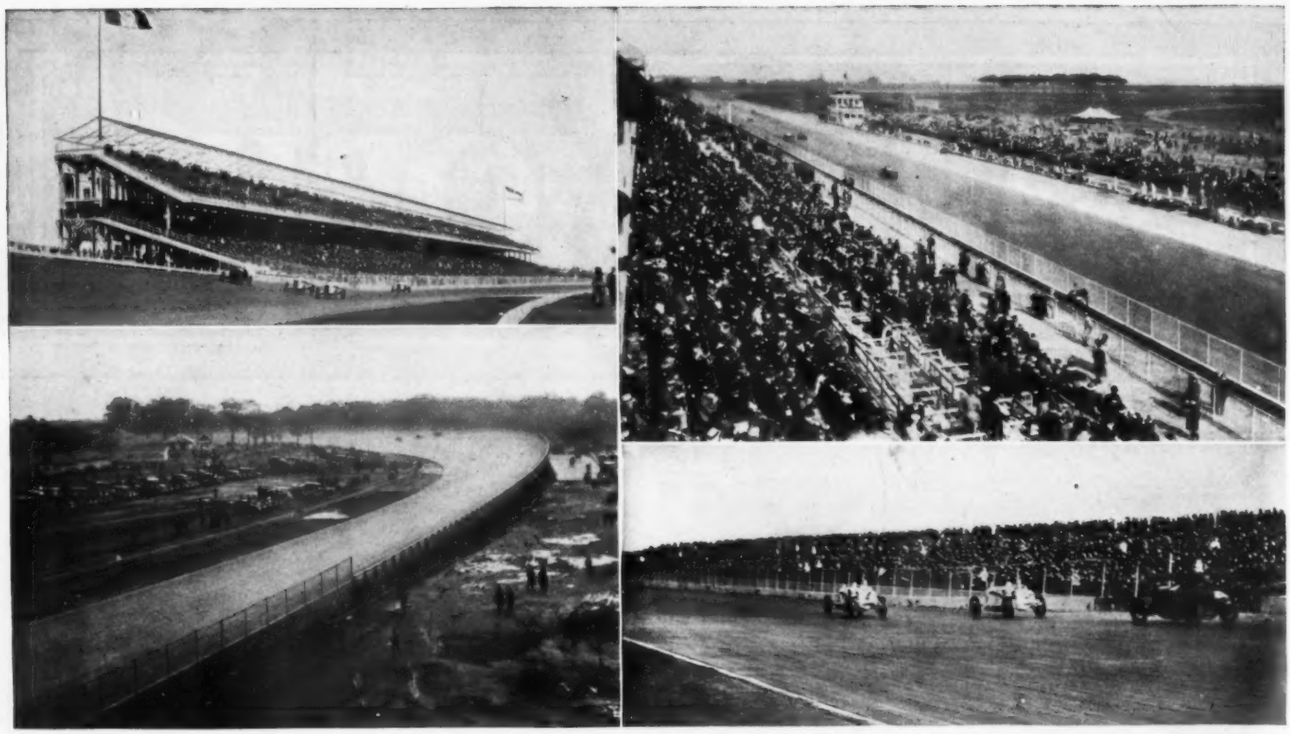
Winners in the Astor Cup Race

Car	Driver	Time	M.P.H.
Stutz	Anderson	3:24:42	102.60
Stutz	Rooney	3:25:29	102.19
Duesenberg	O'Donnell	3:39:55	95.45
Ogren	Alley	3:47:03	92.52
Duesenberg	Henderson	3:47:26	92.31
Delage	Limberg	4:09:23	84.22
Sebring	Haibe	Flagged at 298 miles	
Mulford Spec.	Vail	Flagged at 274 miles	

SHEEPSHEAD BAY MOTOR SPEEDWAY, Oct. 9—Proud is the American eagle to-day. Proud of a victory nobly won over the best that foreign lands could produce. Proud of Gil. Anderson and his triumphant Stutz that completed the 350-miles for the Astor Cup a winner at an average of 102.6 m.p.h.

The great achievement of Anderson alone was an accomplishment that marks a new era in speed competitions, but when Tom Rooney, his team mate, in another Stutz of identical design, crossed the wire 47 sec. later, he completed a victory which sets a new mark for the followers of Mercury. So close were these two white-clad team mates that until the last of the 175 laps had been covered it was impossible to say which would cross the line a winner. Rooney averaged 102.19 m.p.h.

Judgment, design and materials were the factors that lay beneath the surface of the vision of speed. All during the



Estimates of 100,000 attendance were made, the great stands were packed with spectators and the infield with parked cars which are said to have reached the number of 8000

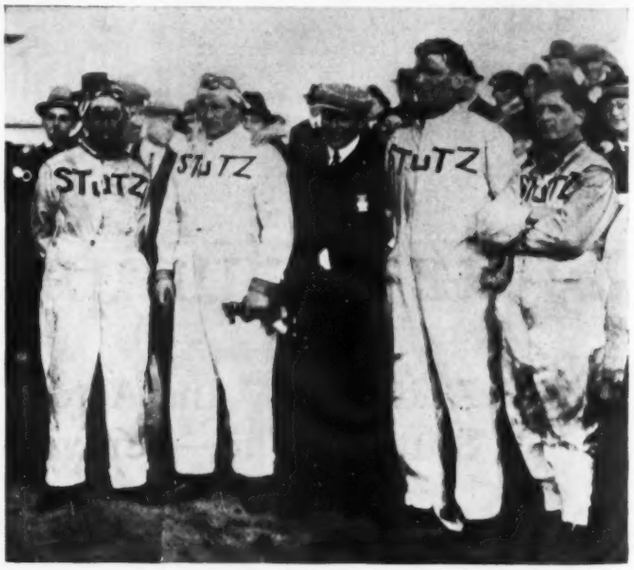
3½-hr. contest the two racers ran with a regularity that showed a realization of what speed was necessary to win, and a determination not to deviate a particle from that speed either to catch those who set too hot a pace at the start or to lag at the finish when the race was won. Like a pair of soaring gulls the Stutz team circled the vast speedway, now gliding along the stretches and now rising like the wheeling birds they resembled high on the parabolic surface of the banked curves. Only one stop did the winner make and but two were made by the second car, the difference in time between the two cars at the finish being practically made up by the additional stop. Anderson's pause in his race to victory was to take on more fuel and Rooney stopped once for the same reason, and besides changed a tire.

Stamina was necessary, stamina of car, stamina of driver and stamina of every vital component. Tires and spark plugs had to stand the strain as well as crankshafts and connecting-rods and to the endurance of the materials Harry Stutz to-day owes the acquisition of 35 points toward the Astor Cup and his drivers the possession of $30,000 in prize money out of the $50,000 total.

Although not making such high speed, great credit for consistent running is owed to the Duesenberg motors and the six cars which they propelled, for of these six no less than five finished in the money and the sixth might have done so had not the driver earned disqualification for a petty breach of the rules.

Contest of Materials

The race was a contest of steel. The scientifically designed track provided the driver with every facility to make all the speed desired and the result, with such men as Resta, Aitken, Oldfield, Burman, De Palma, Wilcox, Mulford, Rickenbacher, Pullen, and others in the line up, was that the drivers were faster than their cars. From the very beginning it was a struggle for leadership, a continuous duel between Stutz and Peugeot, which ended only 6 miles from the finish when all five of the Peugeots had retired to their pits, and two of the Stutzes alone were running.



Harry Stutz with the two winning teams. On his right is Gil Anderson with his mechanic and on his left Tom Rooney

Prizes Won by Drivers in Astor Cup Race

Driver	Speedway Offer	Bosch Magneto	Norma	Vacuum	Total
Anderson	$20,000	$600	$100	$100	$20,800
Rooney	10,000	400	...	...	10,400
O'Donnell	5,000	300	...	...	5,300
Henderson	4,000	...	...	...	4,000
Alley	3,000	...	...	...	3,000
Limberg	2,000	...	...	...	2,000
Haibe	1,400	...	...	...	1,400
Vail	1,200	...	...	...	1,200

Mulford gets $75 for fast elimination lap, given by Vacuum Oil Co.

Resta gets $50 for fast lap during race, given by Norma Co. of America.

Aitken gets a silver trophy with $100 from Motor-Vim Sales Corp., New York City, for leading at 200 miles.

Resta, the cool calculating yet brilliant pilot of the Peugeot quintet, who in the early part of the race achieved a lap at 110 m.p.h., found his magnificent car beaten to surrender at the 104th mile. One of the overtaxed connecting-rods could support the burden no longer.

Aitken in an equally fleet Peugeot, who took up the burden of leadership after Resta had been eliminated, bore the Peugeot flag 138 miles further, at which point he was overtaken by the same fate that had befallen his team mate.

This left Burman alone to uphold the reputation of the house of Peugeot. Nobly he accepted the task and, though with a car slightly slower than the other two, he forced the Stutzes to maintain the pace they had been setting. At last within three laps of the finish, and with $5,000 prize money for third place almost within his grasp, his car too was beaten. A broken clutch removed the last of the Peugeots.

Pete Henderson and Eddie O'Donnell, Duesenberg drivers, with Fred Duesenberg

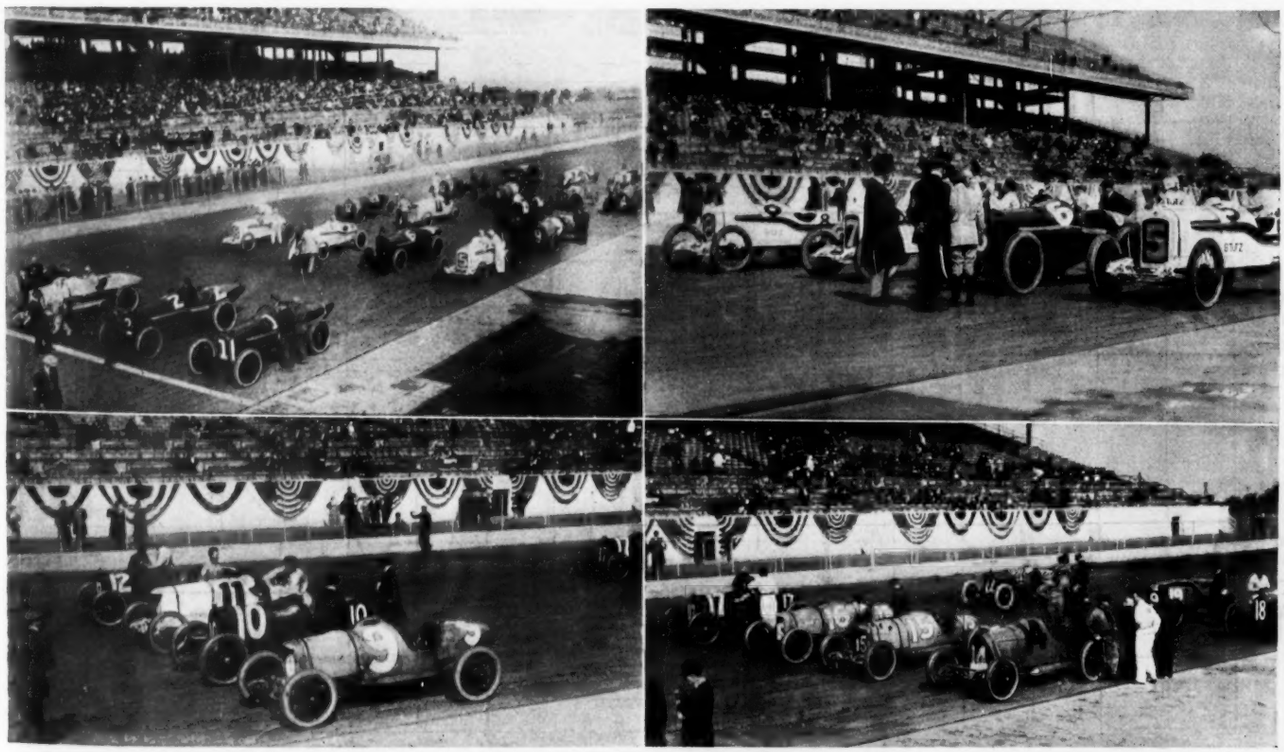
Mulford's new Peugeot ran but 16 miles, suffering then the same fate as that which later overtook Resta and Aitken. Wilcox, too, with the fifth Peugeot came to a stand on the north bank after 74 miles and could not start again.

At the start of the race there were twenty cars. When the starter's flag went down with the signal that the race was over only six had finished and two were still running, but will receive seventh and eighth prize money. Of the six who completed the 350 miles five were American cars. After the two Stutzes were two Duesenbergs driven by O'Donnell and Henderson, occupying third and fifth positions with the Ogren driven by Alley fourth, then came Limberg's Delage, sixth. Haibe's Sebring and Vail's Mulford were still running when the race was called off. Thus, with the Delage, which finished sixth, as the only foreign representative in the race when the end was reached, America's triumph was complete. Far off in the trenches of somewhere in France, Boillot, Goux and Guillot when they receive the news by the devious routes of wartime intelligence will eagerly await the day when they can once again turn the tables. For the nonce, however, American drivers and American cars reign supreme.

An Impressive Spectacle

Never has there been a more impressive scene at an automobile race than that which greeted the throng of enthusiasts when the announcing bomb was hurled high in the air unfurling the stars and stripes which was slowly wafted out to sea by the westerly breeze. The attendance has been estimated as all the way from 65,000 to 100,000 and the true figure probably lies somewhere between these two. With the tremendous inclosure capable of containing many times this number if necessary, it is hard to judge correctly; but stripped to the bare fact it is no doubt true that this Astor Cup race was witnessed by more people than ever entered an inclosure to witness a speed contest at any time in the history of the world.

From early morning New York's great network of transit facilities concentrated its offerings of humanity upon the bridges and tubes leading across the East River to the bor-



Tense Moments—Cars lined up at start waiting for the word which sent them on their momentous ride

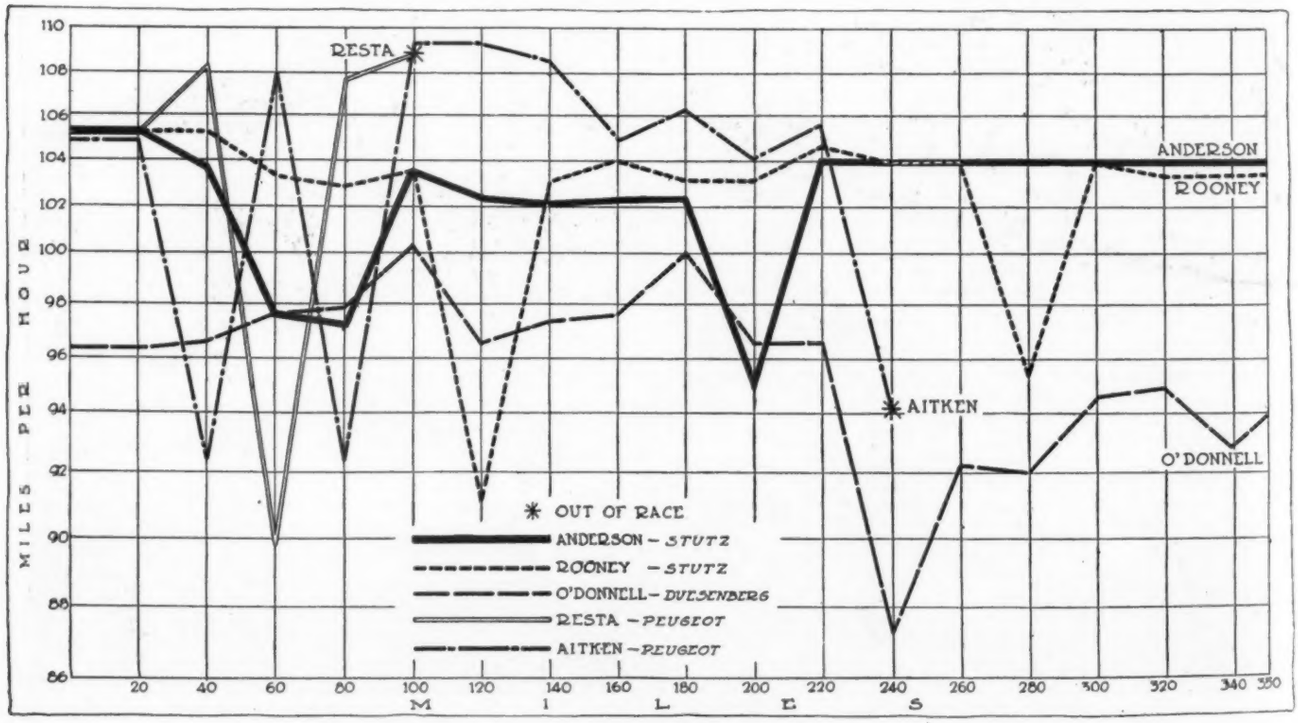
Times of the Cars Every 20 Miles in the 350-Mile Race for the Vincent Astor Cup and

No.	Car	Driver		Miles: 20	Position	40	Position	60	Position	80	Position	100	Position	120	Position	140
5	Stutz	Gil Anderson	Elapsed time	11:25	4	22:51	3	34:29	1	46:10	1	57:48	3	1:09:32	1	1:21:18
			Time for 20 miles			11:26		11:38		11:41		11:38		11:44		11:46
7	Stutz	Tom Rooney	Elapsed time	11:25	3	22:52	4	34:30	2	46:11	2	57:47	2	1:10:59	4	1:22:38
			Time for 20 miles			11:27		11:38		11:41		11:36		13:12		11:39
9	Duesenberg	Ed O'Donnell	Elapsed time	12:28	10	24:54	11	37:11	8	49:27	8	1:01:25	8	1:13:51	6	1:26:11
			Time for 20 miles			12:26		12:17		12:16		11:58		12:26		12:20
22	Ogren	Tom Alley	Elapsed time	13:00	17	25:50	16	38:44	12	51:42	11	1:04:15	12	1:16:57	9	1:29:42
			Time for 20 miles			12:50		12:54		12:58		12:33		12:42		12:45
16	Duesenberg	P. Henderson	Elapsed time	12:36	12	25:18	12	38:02	10	50:36	10	1:03:01	10	1:15:42	8	1:28:27
			Time for 20 miles			12:42		12:44		12:34		12:25		12:41		12:45
19	Delage	Limberg	Elapsed time	13:09	18	25:51	17	40:55	14	53:59	14	1:06:46	14	1:19:29	12	1:32:16
			Time for 20 miles			13:42		15:04		13:04		12:47		12:43		12:47
14	Sebring	Ora Haibe	Elapsed time	12:59	15	42:52	18	1:11:55	15	1:35:52	15	1:49:58	15	2:09:25	13	2:22:25
			Time for 20 miles			29:53		29:03		23:57		14:06		19:27		13:00
11	Mulford Special	Ira Vail	Elapsed time	12:50	13	25:31	13	38:01	9	50:32	9	1:02:47	9	1:15:19	7	1:27:50
			Time for 20 miles			12:41		12:30		12:31		12:15		12:32		12:31
4	Peugeot	Bob Burman	Elapsed time	12:29	11	24:01	6	35:40	5	47:20	4	58:57	4	1:10:44	3	1:22:29
			Time for 20 miles			11:32		11:39		11:40		11:37		11:47		11:45
15	Duesenberg	Willie Haupt	Elapsed time	13:00	16	25:50	15	38:44	13	51:43	12	1:04:26	13	1:17:38	11	1:30:46
			Time for 20 miles			12:50		12:54		12:59		12:43		13:12		13:08
2	Peugeot	J. Aitkin	Elapsed time	11:25	2	24:25	10	35:33	4	48:37	7	59:37	5	1:10:40	2	1:22:03
			Time for 20 miles			13:00		11:08		13:04		11:00		11:03		11:23
20	Stutz	Ralph De Palma	Elapsed time	12:11	7	24:11	7	36:12	6	47:57	5	1:01:22	7	1:13:08	5	1:24:51
			Time for 20 miles			12:00		12:01		11:45		13:25		11:46		11:43
12	Pugh Special	Jack Lecain	Elapsed time	12:51	14	25:49	14	38:43	11	51:44	13	1:04:14	11	1:17:06	10	1:31:05
			Time for 20 miles			13:38		13:34		13:01		12:30		12:52		13:59
10	Maxwell	Ed Rickenbacher	Elapsed time	12:11	8	24:12	8	36:12	7	48:14	6	1:00:09	6	O ut 110 mil	es.	
			Time for 20 miles			12:01		12:00		12:02		11:55				
1	Peugeot	Dario Resta	Elapsed time	11:24	1	22:30	1	35:14	3	46:24	3	57:26	1	O ut 104 mi	les.	
			Time for 20 miles			11:06		13:24		11:10		11:02				
6	Peugeot	Howard Wilcox	Elapsed time	11:28	6	23:15	5	43:18	16	O ut 74 mile	s. Disq	ualified; pu	shed car	.		
			Time for 20 miles			12:27		20:03								
17	Maxwell	Ed Pullen	Elapsed time	12:12	9	24:12	9	O ut 56 mile	s. Broke	n connec	ting-ro	d.				
			Time for 20 miles			12:00										
8	Stutz	Earl Cooper	Elapsed time	11:27	5	22:51	2	O ut 46 mile	s. Broke	n valve.						
			Time for 20 miles			11:24										
3	Delage	Barney Oldfield	Elapsed time	Out 16 mile	s. Bro	ken piston	and conn	ecting-ro	d.							
			Time for 20 miles													
18	Peugeot	Ralph Mulford	Elapsed time	Out 14 mile	s. Bro	ken connec	ting-rod.									
			Time for 20 miles													

ough of Brooklyn wherein is located the great speedway. Mute astonishment was depicted on the faces of the great masses of New Yorkers, who, hardened as they are to new sensations, never had any idea that such a vast structure could have been arranged to provide a track for the speedy cars. With pictures of the Vanderbilt cup races of old still dwelling in their minds, these people who have not seen an automobile race of note since that time, were treated to a sensation that was little short of bewilderment. The atmosphere of the old Sheepshead Bay track where some of the greatest horse races in the metropolitan district were held has been superseded by the mechanical demons of speed which depend upon steel instead of pedigree.

Infield Was Packed

Packed in the infield were those who came to view the race from the reserved parking space. According to Manager Everard Thompson there were 8000 automobiles holding these spaces. Besides these every available open space held its quota of private automobiles.



Average speeds for each successive 20-mile period plotted for the five fastest cars

$50,000 Prizes Held on the New Sheepshead Bay Motor Speedway, Saturday, October 9

Position	160	Position	180	Position	200	Position	220	Position	240	Position	260	Position	280	Position	300	Position	320	Position	340	Position	350	Position	M.P.H.
1	1:33:02 11:44	1	1:44:42 11:40	1	1:57:21 12:39	2	2:08:58 11:37	3	2:20:37 11:39	4	2:32:14 11:37	1	2:43:53 11:39	1	2:55:32 11:39	1	3:07:14 11:42	1	3:18:54 11:40	1	3:24:42 5:48	1	102.69
4	1:34:11 11:33	3	1:45:50 11:39	3	1:57:29 11:39	3	2:08:58 11:29	4	2:20:36 11:38	2	2:32:14 11:38	2	2:44:50 12:36	2	2:56:26 11:36	2	3:08:03 11:37	2	3:19:40 11:37	2	3:25:29 5:49	2	102.19
6	1:38:29 12:18	6	1:50:37 12:08	6	203:03 12:26	5	2:15:29 12:26	5	2:29:18 13:49	5	2:42:24 13:06	4	2:55:17 12:53	4	3:07:50 12:41	3	3:20:37 12:39	3	3:33:32 12:55	3	3:39:55 6:23	3	95.45
9	1:42:33 12:51	9	1:55:22 12:50	8	2:08:13 12:50	8	2:21:07 12:54	7	2:34:03 12:56	7	2:46:59 12:56	6	2:59:35 12:36	5	3:12:53 13:18	4	3:27:35 14:42	4	3:40:35 13:00	4	3:47:03 6:28	4	92.52
8	1:41:17 12:50	7	1:53:45 12:28	7	2:06:19 12:34	7	2:20:28 14:09	6	2:33:14 12:46	6	2:46:18 13:04	5	3:03:14 16:56	6	3:15:32 12:18	5	3:28:24 12:52	5	3:41:15 12:51	5	3:47:26 6:11	5	92.31
12	1:45:06 12:50	11	1:57:54 12:48	10	2:10:40 12:46	9	2:23:33 12:53	8	2:43:56 20:23	8	3:07:19 23:23	7	3:19:53 12:34	7							4:09:23	6	84.22
13	2:35:21 12:56	12	2:48:16 12:55	12	3:01:12 12:56	12	3:14:12 13:00	11	3:27:27 13:15	11	3:45:02 17:35	8	3:58:27 13:25	8	Flagged	at 298	miles.						
7	1:42:13 14:23	8	2:01:28 19:15	11	2:18:32 17:04	11	2:49:24 30:52	10	3:12:51 23:27	10	3:46:16 33:25	9	Flagged	at 274	miles.								
3	1:34:13 11:44	4	1:45:51 11:38	4	1:57:30 11:39	4	2:08:57 11:27	2	2:20:36 11:39	3	2:32:14 11:38	3	2:45:56 13:42	3	2:57:37 11:41	..	3:09:13 11:36	..	3:20:49 11:36	Out	346 miles Trans mission t rouble		
10	1:43:08 12:22	10	1:56:44 13:36	9	2:11:58 15:14	10	2:32:45 20:47	9	2:53:12 20:27	9	Out 254	miles.	Disqual	ified; p	ushed ca	r.							
2	1:33:30 11:27	2	1:44:48 11:18	2	1:56:21 11:33	1	2:07:43 11:22	1	2:20:27 12:44	1	Out 240	miles.	Cracked	cylind	er.								
5	1:36:34 11:43	5	1:48:14 11:40	5	2:03:33 15:19	6	Out 210	miles.	Broken	ball be	aring.												
11	Out 156	miles.	Broken	clutch	collar.																		

Burned bearing.

Broken connecting rod.

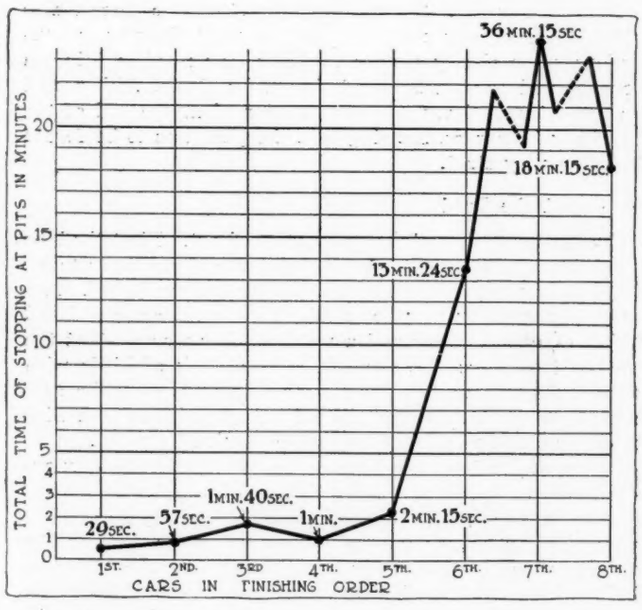
Speedway Organization Proves Good As Huge Crowd Gathers

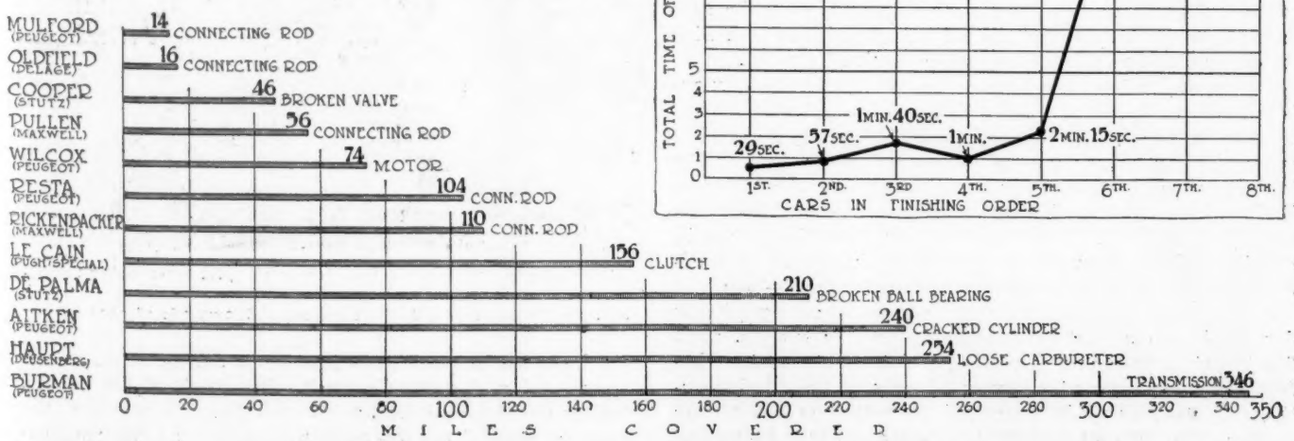
Besides the cars in the infield there were great numbers of pedestrians who preferred to view the race from on foot instead of from the bleachers. The grandstands were easily 85 per cent filled. The masses of spectators were like restless waves as they shifted and swayed, until from the infield the whole scene resembled a sea of faces and colors as the garments of men and women reflected the sun which combined with a gentle west wind to make the day ideal.

Not long after 9 o'clock in the morning the crowds began to stream through the gates. Carefully marshalled under the guardians of the Speedway, those on foot made their way into the grandstands and into the infield while those who preferred to witness the race from their cars drove into their appointed positions in the parking spaces, two deep along the home stretch. A tremendous wave of sound filled the air as the continuous roar of the crowd was punctuated from time to time with the crackling of the exhausts and the hoarse shouts of the megaphone-armed announcers who from the official stand across the track from the grandstand received word from time to time regarding the progress of events.

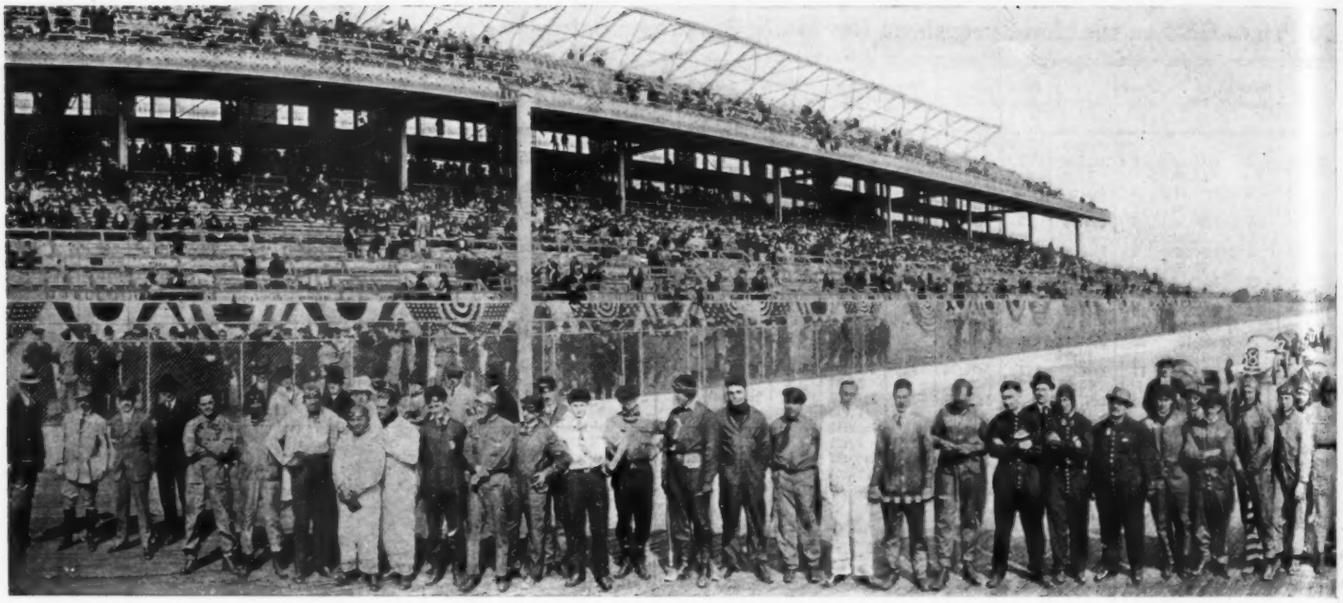
Race Started at Noon

Shortly before 12 o'clock, at which time the race was scheduled to start, the officials appeared for the inspection




MULFORD (PEUGEOT) 14 CONNECTING ROD
OLDFIELD (DELAGE) 16 CONNECTING ROD
COOPER (STUTZ) 46 BROKEN VALVE
PULLEN (MAXWELL) 56 CONNECTING ROD
WILCOX (PEUGEOT) 74 MOTOR
RESTA (PEUGEOT) 104 CONN. ROD
RICKENBACKER (MAXWELL) 110 CONN. ROD
LE CAIN (FUGHT SPECIAL) 156 CLUTCH
DE PALMA (STUTZ) 210 BROKEN BALL BEARING
AITKEN (PEUGEOT) 240 CRACKED CYLINDER
HAUPT (DUESENBERG) 254 LOOSE CARBURETER
BURMAN (PEUGEOT) TRANSMISSION 346
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 350
MILES COVERED

Miles covered by cars which dropped from the race because of mechanical troubles. Upper right—Total time spent at pits by leaders



of the track, the racers were lined in the positions they had earned while in the qualifying trials and all was made ready to send the speedy cars on their way. Just at 2 minutes to twelve the cars were started around amid a great roar from the now rapidly filling stands, on their exhibition paced lap. Four deep in rank and five in file the twenty cars traveled around the track at about 60 miles an hour and as they again crossed the line Fred Wagner, official starter, sent them on their way.

Three of the four cars in the front line were dark blue Peugeots numbered from inside to outside 1, 2 and 4. Number 3 was a Delage. The second line of four cars had three Stutzes and a Peugeot, the Stutz numbers being 5, 7 and 8 with 6 the Peugeot. Thus at the very start, the three teams which were always regarded as the most dangerous contenders, were closely grouped. Resta was number 1 in his Peugeot and cars 1, 2 and 4 driven by Resta, Aitken and Burman streamed out in the order named at the end of the first lap of the race, showing that the pace was to be forced from the very start.

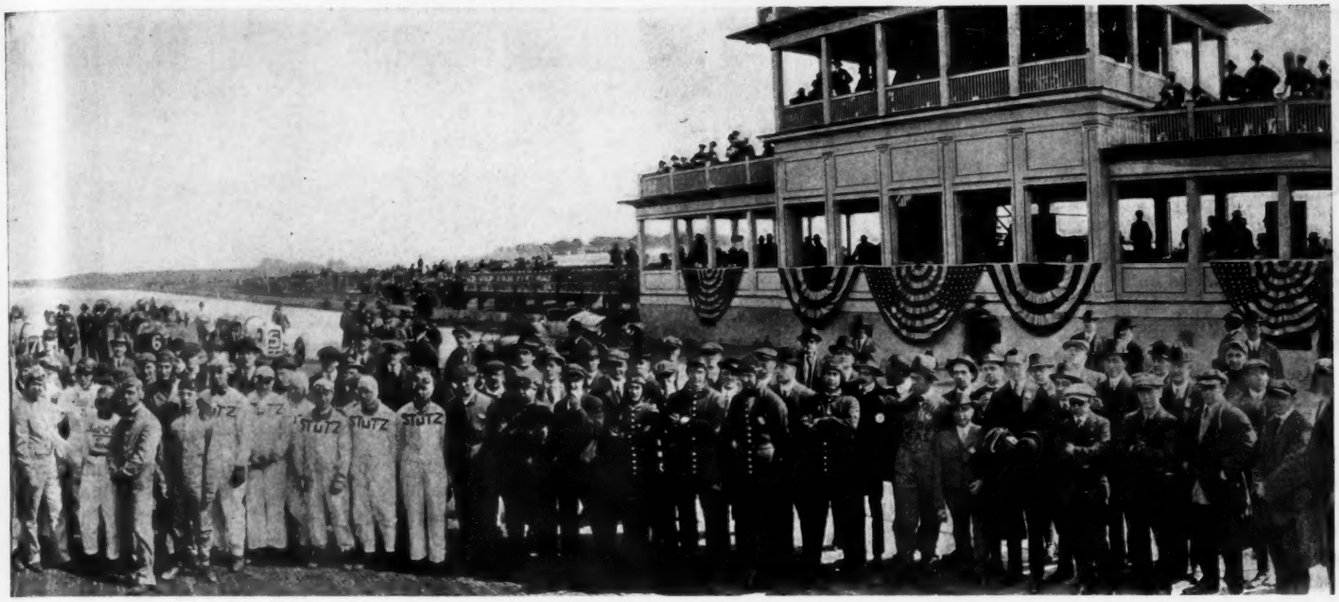
Above—Resta pushing his Peugeot to the pits after being retired from the race by a broken connecting-rod
Below—The huge infield offers space for thousands of cars

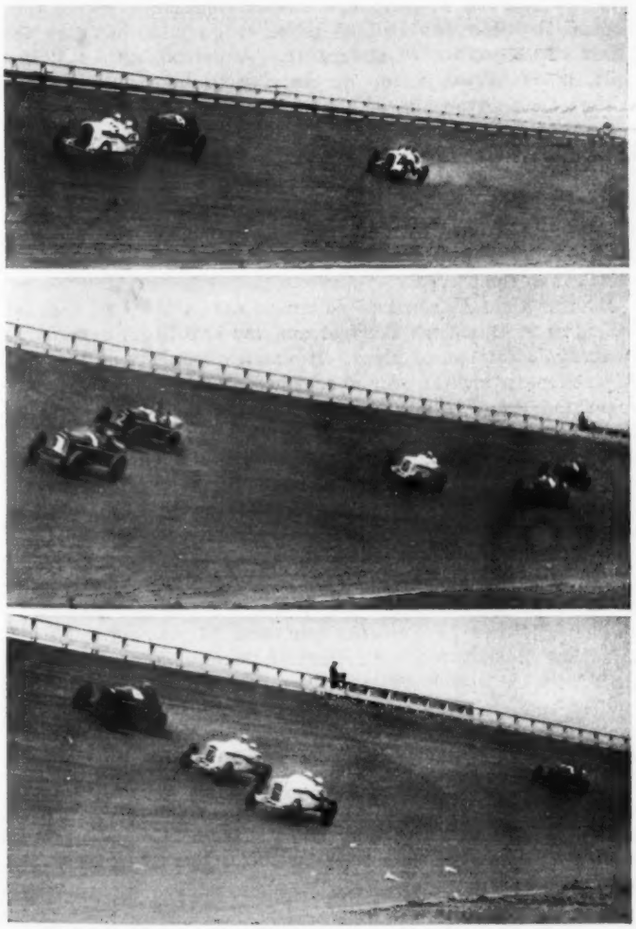
Peugeots Take Lead

Gradually the line of racers lengthened out. First the blue Peugeots, then the light blue Delages, the white Stutz team, the gray Duesenbergs, the green Sebring, gray and black Maxwells all streaking past so rapidly that when close at hand a blur of passing color and a vivid number was all that the eye could photograph. Gracefully as a flock of birds with wheels which seemed not to turn but to glide over the surface of the track they sped around the great board disk with its surface that resembled the smooth deck of a yacht.

Like a pack of hounds trailing the quarry the barking exhausts of the speeding pursuers forced Resta to do his utmost to hold his early acquired lead. Even among the Peugeots the rivalry for first place seemed to be forcing the leaders to speeds which were dangerously near the ultimate. Each car was possessed of so much endurance measured in speed and distance. The Peugeots took from their store in speed, the Stutz team gaged accurately what could be sacrificed in speed to gain the necessary endurance and—won.

As the minutes passed the group of massed cars gradually developed into a line punctuated by smaller groups, until finally not more than a few seconds elapsed at any time before a car would pass the stands. Singly, in twos and sometimes as many as six in a struggling group they would come gliding down the half mile level stretches and then rising like aeroplanes up the easements into the great parabolic curves at each end of the elliptic track. The smell of hot rubber, burning gasoline and overheated steel filled the air while the babble of voices from the packed seats brought the imagina-





Top—De Palma for many miles trailed Anderson and Burman
Center—Resta with Aitken on his heels leads the field
Bottom—The famous trio, Burman, Anderson and Rooney

tion back to the days of Rome where it was thumbs down for he who failed in battle.

Not an accident marred the day, although the management had provided surgeons and nurses for emergency.

Stutz Pit Signals Big Factor in Victory

All through the day the pits presented a busy scene. When not actually engaged in work upon the cars the attendants were signaling positions and instructions. It is not too much to say that a factor in the victory of the Stutz cars was the level-headed guidance from the pit coupled with the rigid obedience to these signals on the part of the drivers. Tire changes were made in 30 seconds and under. Gasoline was hurled into the tanks in marvelously short time but oftentimes with great wastage as the attendants in their excitement neglected the fact that the mouth of a funnel is only so large even if it is big enough to go over a man's head.

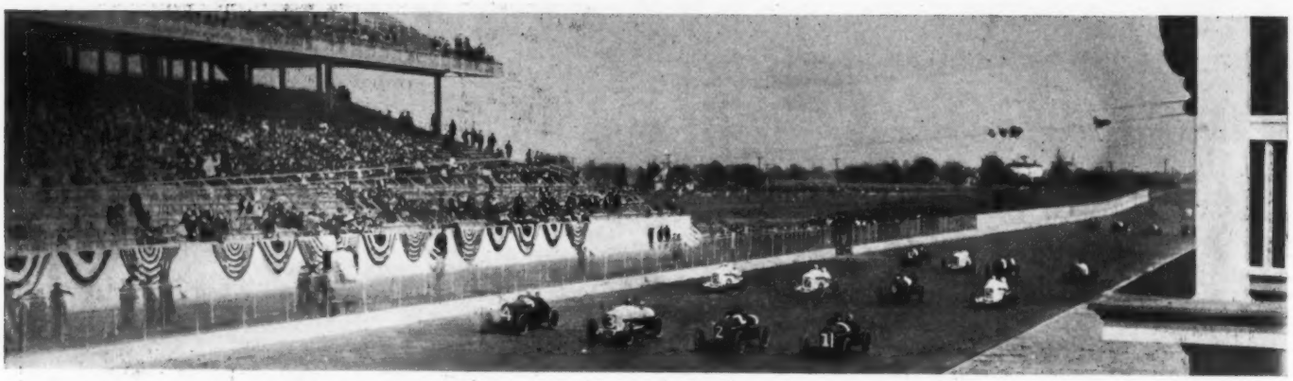
Winner Stopped Once

Anderson stopped but once to take on gasoline. Rooney in the second Stutz stopped once for gasoline and once again to change a right rear tire. O'Donnell's Duesenberg, which finished third, made one stop for gasoline and oil. Alley's Ogren stopped once for the same reason and Henderson, did likewise, with an additional pause for new plugs.

Mechanical troubles bothered the rest who finished, but a prominent fact is that of the eight cars which took prize money, only two changed tires, and these but one apiece. They were Rooney's Stutz and Limberg's Delage.

At 4 o'clock the race was over, having lasted 4 hr. from the time of start. After Anderson had flashed across the line the great crowd started to dwindle rapidly and as they slowly filed from the stands to the awaiting cars and trains the mingled comments arose in a murmur which could be heard throughout the great enclosure. Few regretted having seen the wonderful spectacle and the comments were mostly of awe-struck amazement at the fearful speed attained with the safety which was brought strongly to the fore by the lack of the slightest accident. Practically 103 m.p.h. average had been made for a distance of 350 miles. At this rate of speed it would take but 30 hr. to cross the great continent of America. It would take 10 days to encircle the globe at the equator.

At the end of the first 20 miles there were but eighteen cars of the twenty left in the race. Ralph Mulford had been forced to withdraw his Peugeot on account of a broken connecting rod and Barney Oldfield, with a broken piston, connecting rod and crankcase, also was out of the race. At this



Crossing the line for the first time on the 350-mile grind, showing how evenly the cars maintained their positions on the paced lap

time Resta's flying Peugeot was holding the lead, closely followed by Aitken in his Peugeot and Rooney's Stutz. Immediately behind with not a foot separating the two cars was Gil Anderson in the Stutz, which finally won the race. Resta was setting a heart-rending pace. He was clocked for the twenty-second lap in 65 sec. about 110 m.p.h., the fastest lap of the day. His speed for mile after mile averaged better than 107 m.p.h. This pace soon told on his tires and at the end of the twenty-ninth lap he was forced to make a change on his right rear. This delayed him but a few seconds but enough to lose the lead which was eagerly snatched by Gil Anderson; and the white Stutz racer now became the pacemaker. At 60 miles Anderson was leading with Rooney second and Resta, gaining a few yards on every stretch, third.

When 80 miles was reached Anderson had averaged 103.97 m.p.h. with Rooney still second, and Resta, making laps at 109 m.p.h., third. At 60 miles Ed Pullen's Maxwell and Earl Cooper's Stutz had been eliminated and at 80 miles Howard Wilcox's Peugeot felt the strain of the sustained pace and could not start again after coming to a stop on the north curve. Between the eightieth and one-hundredth miles no eliminations were made, but at 100 miles Resta was again in the lead, having caught the Stutz at 84 miles and shortly after Rooney halted for a tire change. Resta had passed the 100-mile mark in 57 min. and 26 sec., which exceeded the recent record on the Chicago track by nearly a minute and a half.

Peugeot Broke Rod

Just after rounding the turn on the 104th mile Resta's Peugeot began to slacken its pace. A connecting rod had failed and the car was out. It had to be pushed to the pits and the Stutz team had lost their most formidable antagonist. Close behind Resta at the 100th mile were Rooney, Anderson, Burman and Rickenbacker. Rickenbacker had not much farther to go, however, as at the 108th mile he also broke a connecting rod putting his Maxwell among the list of those who had tried but failed. With Resta eliminated, Aitken, who had been delayed at the start, by tire troubles, which persisted to such an extent that he had to make four changes in less than three-quarters of an hour, began to become an important factor in the race. Anderson led at the 120th mile, having covered the distance in 1 hr., 9 min. and 32 sec. at the rate of 103.52 m.p.h. At the 140th mile Anderson was still the leader but Aitkin was crawling up, being less than a minute behind. Burman's Peugeot was 23 sec. behind this, and Rooney 9 sec. back of Burman.

Near the 160-mile mark Vail, who drove the Mulford Special, was compelled to give way to a relief driver due to the fact that he was partially overcome by the fumes of burning castor oil. George Theobold took his place and was the only relief driver used in the race. At 156 miles LeCain had to quit the race on account of a broken clutch collar on the Pugh Special.

All this time Aitken was slowly gaining on Anderson until at the 160-mile mark the latter only led by 29 sec. Rooney followed third and Burman fourth just 2 sec. apart. The race had settled down to a four-sided affair with the two Stutzes against the two Peugeots of Aitken and Burman.

At the 186th mile Aitken flashed into the lead and once more those who were hoping for America to win began to lose heart. The Peugeot had shown superior speed to the Stutz but there was still 65 miles to go and that last 60 miles was a matter of endurance. Anderson, at the 186th mile, made his only stop of the day to take on gasoline. Aitken took advantage of the time to increase his lead by more than half a lap and at the 200-mile mark he led by close to a minute, Rooney taking and leading Burman with DePalma fifth. At this time O'Donnell was sixth, Henderson seventh, with the remaining cars trailing behind. But it was not for long that DePalma remained a factor in the race. At 210 miles a broken ball bearing drove him out, narrowing the field to ten.

By this time Aitken had gotten so far in the lead that it looked as if Burman's Peugeot and the two Stutz cars were to struggle for second place. It was a close fight and waves of excitement swept over the crowd. Only a few seconds separated them at any instant. In the meanwhile Aitken made a stop for gasoline which he managed to take on in 30 sec., but got away again so fast that this did not cost him his lead. Only a few minutes later, when he had traveled 240 miles a cracked cylinder ended his chances of winning the race and entirely altered the prospective leadership.

The fight was now between Burman and the two Stutzes. Rooney took the lead at 260 miles, a few hundredths of a second in advance and so close was it that the timing instrument clocked all three cars at 152 min. and 14 sec., although at this time Rooney led with Burman second and Anderson third with the speed 102.46 m.p.h up to that time. Here the leaders saw that the speed must be increased, if anything, for a win and, wheel to wheel, they tore around the track until 12 miles further on Rooney and Burman both stopped for gasoline. The stop took longer than it should have for Burman lost nearly a lap and a half to Anderson. Rooney also went ahead and with 70 miles still to go Anderson led with Rooney second and Burman third, the leader being 2 min. ahead of Burman.

Burman Made Race

From this point on Anderson held his lead with Rooney and Burman fighting for second place until 340 miles. Then came Burman's breakdown and the veteran, after his magnificent driving for 3½ hr., was compelled to abandon the race. Never did a man drive a more courageous race in vain. Never did a speedway crowd owe more to an unrewarded driver, for Burman made the race but won no prize. Had it not been for his determination 100 m.p.h. average need never have been reached.

Leaders Make Few Stops at Pits

One Tire Change of Five American Cars Which Finished—Broken Connecting-Rods and Spark Plug Troubles Prevalent—Average 5 Miles per Gallon of Fuel—Water Connections Leaked

IN the final analysis the Astor cup race was a struggle of endurance. The stamina of steel and other materials was tested to the utmost and that the stresses on the vital parts of the cars were always close to the ultimate was shown by the fact that from an original field of twenty but eight cars were running when the race was called off.

All the thrills and triumphs took place on the board track where the speeding cars forced the pace higher than ever before in a race of this character. At the pits the activities were not as spectacular but even more deeply filled with meaning as to the hopes and fears of the struggling pilots.

Six Cars Finished

Only six cars finished the 350 miles and two were running when the race was brought to a close. And of the six that finished, the first five were American cars which showed their endurance to such a degree that it need never be said again that America cannot produce cars at least equal to those of Europe. These five cars all were forced at some time during the race to come to the pits; but of the five three only made one stop each for fuel and oil. The other two made one additional stop each, the second Stutz to change a right rear tire and the Duesenberg, which finished fifth, made a change of plugs. Thus the total stops for the first five cars were but seven.

Limberg's Delage which finished sixth, and was the only foreign car to go the distance, stopped three times, making a change of a tire, taking on fuel and water besides making ignition and carbureter adjustment. The two other cars which remained in the running until flagged off the course were Haibe's Sebring and the Mulford Special. The first of these made seven stops and the other five stops.

Early in the race the remarkable pace set by the Peugeot team began to tell upon the striving cars which tried to follow their lead. Before the race was ½ hr. old eight cars had limped into the pits for various repairs. The race endured 4 hr. In the second half hour ten stops were made; in the third half hour period, five; in the fourth, five; in the fifth, eight; in the sixth, nine; in the seventh, four, and eighth, two.

In the first 20 miles two cars were eliminated, these being Mulford's Peugeot and Oldfield's Delage. Between 40 and 50 miles two others went out, Cooper's Stutz and Pullen's Maxwell. Between 60 and 80 miles Wilcox's Peugeot dropped. The next to fall by the wayside were between 100 and 120 miles when Resta's Peugeot, the pacemaker to that time, and Rickenbacher's Maxwell broke down. The next elimination was Lecain's Pugh Special at 156 miles, then De Palma's Stutz at 210 miles, Aitken's Peugeot at 240 miles, Houk's Duesenberg at 254 and finally Burman's Peugeot with only 4 miles to go.

The greatest number of stops was for the replenishment of fuel tanks necessary for every one. On the average the tank capacities of the cars was about 40 gal. and on this amount they ran for about 200 miles, the fuel consumption average being quite close to 5 miles per gallon. The stops for gasoline were fourteen in all. Tires and oil were next in order of importance, ten stops being made for each, although oftentimes oil and gasoline were replenished at the same time that tires were changed. Tire troubles started early. Aitken's Peugeot, although afterwards in the lead and the pacemaker of the race, had to make four changes in the first 45 min. Before he had been on his way 20 min. he had to make his first change and another one 4 min. later.

Mechanical Troubles Early

Mechanical troubles also started early in the race. The stops for spark plugs had a greater total than any other in this classification, seven cars pausing at the pits for their renewal. Carbureter troubles caused five interruptions; water systems four; valves and valve mechanisms three; connecting-rods four, and bearings two. Judging from the results during the race it almost looked as if connecting-rods defeated the Peugeot team, for three of the five had to abandon the race because these had broken.

Stops for such important reasons as breaks in the valve mechanism, connecting-rods and bearings were practically always fatal and resulted in withdrawal of the car from the race, and as time went on it became more and more evident that parts which stood up nobly under the stresses of 90 and 95 m.p.h. soon went to pieces at the 100-mile pace necessary to hold a place in the race. The leaders, strong in the faith

The greatest thrill of all. Wild enthusiasm prevails as the cars roar by on the first lap of the race

Studies of effort and of resignation. Top—Wilcox changes plugs. Center—Bringing in Resta's vanquished car. Lower—De Palma takes a new right rear tire as the other cars roar by

of the stamina of their cars immediately adopted the tactics of running the weaker competitors to death, and one by one those who had asked more than steel could supply were forced to crawl to the pits with parts broken that could not be repaired. Although attaining an average speed higher than any had anticipated, Gil Anderson did not have to come to the pits once for a tire replacement. His only stop was for gasoline. His team mate, who was less than a minute behind had stopped but once for tires and at the time of making his change, as much gasoline as could be thrown into the tank during the rapid change of wheels, was supplied. The tire change, however, was so rapid, that more gasoline was splashed on the concrete pit pavement than into the tank.

Six out of the eight who finished did not change a wheel from one end of the race to the other; in fact of the twenty who started but ten tire changes were made and among the eight who finished the total tire changes were two. Tom Rooney changed a right rear on his Stutz when the race was just an hour old, and Limberg changed a right front on his Delage half an hour after first crossing the line.

Making a study of the tire changes it is interesting to note that of the ten tires changed, nine were on the right side, the only left was the rear on Haupt's Duesenberg which was changed at the same time as the right rear because the pit attendants thought it looked worn. The tires at the end of the race did not seem to have traveled the 350 miles at such a speed and it was a noteworthy fact that most of the failures were not due to wear but rather to the ripping off of the tread. The only car equipped with fabric tires, that is Tom Alley's Ogren which had Nassaus, went through the race without a change.

After Oldfield's Delage and Mulford's Peugeot had been eliminated before 20 miles had been traveled, Wilcox brought his Peugeot to the pits for water and a right tire. The overheating was the first sign of the trouble which caused him later to drop out of the race. Fifteen minutes after his first stop he had to make another to take on more water and this time to change his plugs which were so hot that the points were fused practically together. Six minutes later a loose magneto wire, and irregular firing made him stop again, after which he was eliminated automatically by pushing his car which had developed engine trouble of such a serious nature that he could no longer run.

Aitken Had Tire Trouble

Aitken's tire troubles developed soon after the race started. A right front was changed after he had been on his way 19 min. Four minutes later a right rear, then a 16-min. interval and another right front, and 15 min. later another right rear. From this time on he suffered no more tire trouble, but later in the race, when he had held the lead for many a long mile, a broken valve and a cracked cylinder forced him to come to the pits. When water was put in the radiator it poured out the exhaust pipe showing that his trouble was too serious to resume the race.

Spark-plug troubles which occurred frequently during the race showed that many of the drivers were either oiling so lavishly that the plugs had become sooted or the design of the cylinder casting was such that the heat was not carried rapidly enough away from the plugs. This bothered Haibe in his Sebring throughout the race. After traveling but 20 min. he stopped and renewed two plugs. Not 15 min. after this his water connections developed a leak and drenched his magneto. A half hour later he had the same trouble and then after another half hour he stopped for two new plugs and shortly after for three more and some oil. He took on plugs and oil again when he had been traveling for 2 hr. and changed two others just before finishing seventh.

A stop for change of plugs was made by Henderson in the Duesenberg not long after he had traveled three-fourths the distance. This was his second stop as when he had just about reached the half-way mark he took on gasoline and oil. Limberg in his Delage changed all his spark-plugs while taking on gasoline and making a carbureter adjustment just after Henderson in his Duesenberg had changed his plugs. The Limberg-Delage was one of the two who finished with tire changes, Tom Rooney, in his Stutz, being the other.

Ira Vail in the Mulford Special went through the greater part of the race with a trouble which threatened at any moment to become serious. This was a cracked exhaust sustained after he had been on his way 1 hr. and 40 min., and had traveled just half the 350 miles. He had a cracked exhaust manifold between the first and second cylinders but this did not prevent his continuing the race and finishing in eighth place. Vail's other troubles were a leaky pump gland, a carbureter adjustment and a dirty carbureter strainer. The leaking pump gland bothered Vail in very much the same way as it did Haibe.

Broken Connecting-Rods

The third car to drop out in the race was Pullen's Maxwell, which had a broken connecting-rod and as a result a broken crankcase. Resta's second stop was his last, as he was eliminated when the race was 1 hr. old, by a broken connecting-rod. Previous to this he had made one stop for a right rear shoe. Only 2 min. after Resta went out, a burned-out bearing eliminated Rickenbacher and his Maxwell, which had not

Two of the derelicts, Mulford's Peugeot and Oldfield's Delage, abandoned at the pits

previously pulled up to the pit wall. The first stop of Jack Lecain's Pugh Special also indicated a fatal mishap as he was forced to leave the race because of a broken clutch collar.

Ralph De Palma's large following were all disappointed, for after changing a right rear tire when he had traveled about one-third the distance, he very shortly after had to make another stop for water, gasoline and oil, and later was put out of the race by a broken ball bearing. Evidently he had suspected the trouble on his previous stop, for while the water, gasoline and oil were being added he had lifted the hood to inspect his motor.

Bob Burman Unfortunate

A genuine sigh of sympathy went up from the stands when Bob Burman after running a magnificent race for 346 miles, and having but two laps to go to finish, was forced to drop out with a loose flywheel, which put his clutch out of commission. Burman had not made a stop before this time except to take on gasoline and oil after he had traveled nearly 300 miles.

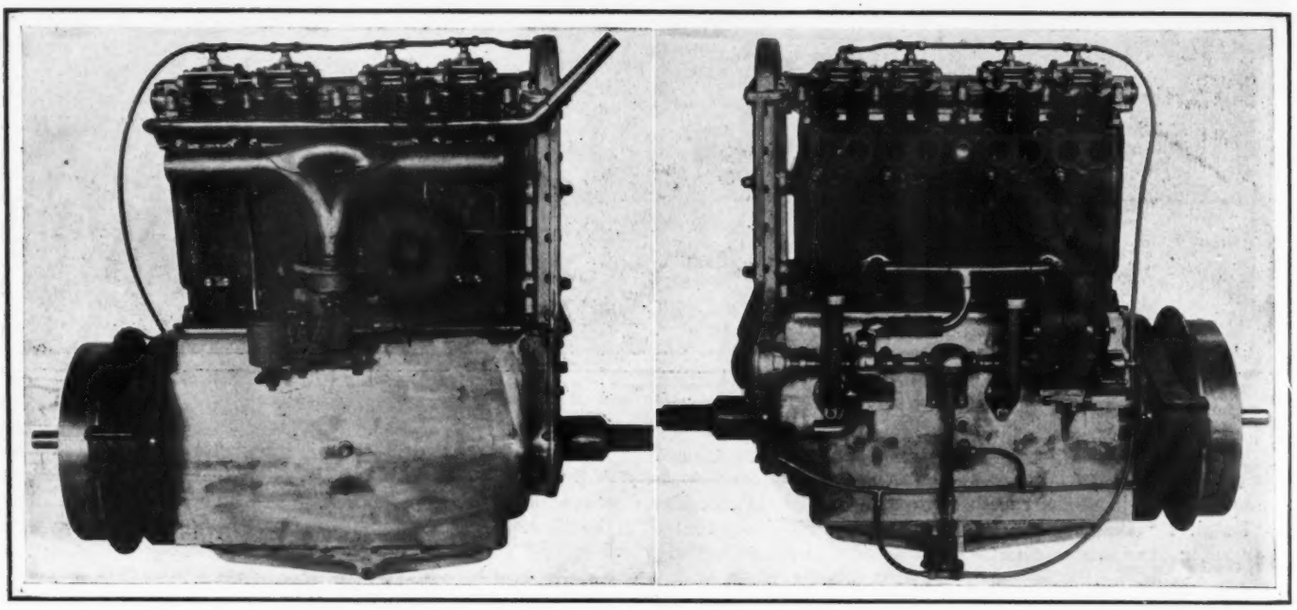
Little time was lost on this stop, and he still had an excellent chance to win the race, or at least to finish in second place as he was neck and neck with Tom Rooney's Stutz at the time. The two remaining Stutzes at this time were in first and second positions. The third Stutz, driven by Earl Cooper, had been forced to leave before the race was half an hour old, with a broken valve.

Willie Haupt nearly came in for some prize money with his Duesenberg car, but a loose carbureter caused him to push his car when he was well along toward the end of his run. He had not been making many stops before this as he did not draw up to the pits until more than 2 hr. after the race had started, when he took on gasoline, water and oil. Shortly after this a broken inlet rocker arm reduced his number of available cylinders to three. Again he made a stop for a right and left rear tire and then another stop for a carbureter adjustment which was the forerunner of the trouble which finally put him out when he started to push his car with its loose carbureter, thereby rendering useless many a weary mile he had plugged along with a three-cylinder motor.

Specifications and Equipment of the Cars Starting in the Astor Cup Race on the Sheepshead Bay Motor Speedway, Oct. 2

No.	Car	Driver	Mechanic	Cylinders	Cast	Bore	Stroke	Cubic Inch Displacement	VALVES		Spark Plugs	Carbureter	Magneto	Oil	Grease	TIRES			Wheels, Make	Wheelbase	Shock Absorbers	Weight	Motometer
									Operation	No.						Make	Front	Rear					
1	Peugeot	Dario Resta	McCarthy	4	Block	3.60	6.67	274	OH shaft	16	K.L.G.	Zenith	Bosch	Oilzum	Dixon	Silvert.	34x4½	35x5	R.W.	106	T.-H.	2400	Boyce
2	Peugeot	J. Aitkin	Becker	4	Block	3.60	6.67	274	OH shaft	16	Oleo	Zenith	Bosch	Oilzum	Dixon	Silvert.	34x4½	35x5	R.W.	106	T.-H.	2300	Boyce
3	Delage	Barney Oldfield	Dasbach	4	Block	3.66	7.09	298	OH shaft	16	Rajah	Claudel*	Bosch	Oilzum	Dixon	Firest.	34x4½	35x5	R.W.	104	T.-H.	2250	Boyce
4	Peugeot	Bob Burman	Gable	4	Block	3.65	7.10	296	OH shaft	16	K.L.G.	Zenith	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x4½	R.W.	105	T.-H.	2350	Boyce
5	Stutz	Gil Anderson	Scott	4	Block	3.81	6.50	296	OH shaft	16	Bosch	Strom.	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x5	Houk	102	T.-H.	2340	Boyce
6	Peugeot	Howard Wilcox	Rout	4	Block	3.60	6.67	274	OH shaft	16	Oleo	Zenith	Bosch	Oilzum	Dixon	Silvert.	34x4½	35x5	R.W.	106	T.-H.	2300	Boyce
7	Stutz	Tom Rooney	Rocco	4	Block	3.81	6.50	296	OH shaft	16	Bosch	Strom.	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x5	Houk	102	T.-H.	2404	Boyce
8	Stutz	Earl Cooper	Dutton	4	Block	3.81	6.50	296	OH shaft	16	Bosch	Strom.	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x5	Houk	102	T.-H.	2385	Boyce
9	Deusenberg	Ed. O'Donnell	J. Henderson	4	Block	3.75	6.75	297	Verti. rocker	16	Rajah	Zenith	Bosch	Oilzum	Dixon	Silvert.	32x4½	33x5	R.W.	106	T.-H.	2170	Boyce
10	Maxwell	Ed. Rickenbacher	Getz	4	Block	3.75	6.75	298	OH shaft	16	K.L.G.	Zenith	Bosch	Oilzum	Dixon	Silvert.	32x4½	35x5	Houk	105	T.-H.	2202	Boyce
11	Mulford Special	Ira Vail	Wright	4	Block	3.98	6.00	299	Verti. rocker	8	Rajah	Master	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x4½	R.W.	101	T.-H.	2100	Boyce
12	Pugh Special	Jack Lecain	Pugh	4	Block	3.98	6.00	299	Verti. rocker	8	Bosch	Master	Bosch	Oilzum	Dixon	Silvert.	33x4½	33x4½	Houk	106	T.-H.	2400	Boyce
14	Sebring	Ora Haibe	Guion	4	Block	3.98	6.00	299	Verti. rocker	8	Rajah	Master	Bosch	Oilzum	Dixon	Silvert.	32x4½	33x5	R.W.	102	T.-H.	2499	Boyce
15	Deusenberg	Willie Haupt	Alexander	4	Block	3.98	6.00	299	Verti. rocker	8	Bosch	Schebler	Bosch	Oilzum	Dixon	Silvert.	32x4½	34x4½	R.W.	106	T.-H.	2120	Boyce
16	Deusenberg	P. Henderson	Johnson	4	Block	3.75	6.75	298	Verti. rocker	8	Rajah	Zenith	Bosch	Oilzum	Dixon	Silvert.	32x4½	34x4½	R.W.	104	T.-H.	2100	Boyce
17	Maxwell	Pullen	Stafford	4	Block	3.75	6.75	298	OH shaft	16	K.L.G.	Zenith	Bosch	Oilzum	Dixon	Silvert.	34x4½	35x5	Houk	105	T.-H.	2267	Boyce
18	Peugeot	Ralph Mulford	Stevens	4	Block	3.60	6.67	274	OH shaft	16	Rajah	Zenith	Bosch	Castor	Dixon	Silvert.	34x4½	34x4½	R.W.	106	T.-H.	2300	None
19	Delage	Carl Limberg	Hartman	4	Block	3.66	7.09	298	OH shaft	16	K.L.G.	Zenith	2-Bosch	Oilzum	Dixon	Silvert.	33x4½	33x4½	R.W.	110	T.-H.	2350	Boyce
20	Stutz	Ralph DePalma	Fontaine	4	Block	3.81	6.50	296	OH shaft	16	Bosch	Strom.	Bosch	Mono.	.....	Silvert.	32x4½	33x5	Houk	102	T.-H.	2404	Boyce
22	Ogren	Tom Alley	Smith	4	Block	3.98	6.00	299	Verti. rocker	8	Rajah	Rayfield	Bosch	Oilzum	Dixon	Nassau	33x4½	34x5	Houk	102	T.-H.	2499	Boyce

*4 of them.
Strom.—Stromberg. Mono.—Monogram. Silvert.—Silvertown. Firest.—Firestone. T.-H.—Truffault-Hartford.



Right and left hand views of Wisconsin-Stutz racing motor. Observe center connection on intake manifold which balances pressure

America's Engineering Triumph

Europe's Finest Cars Completely Vanquished By the Product of American Engineering Skill

By A. Ludlow Clayden

NEVER before in America has there been better representation of the finest European racing cars than at the Sheepshead Bay Speedway, despite the fact that the majority were of one make, for that make is the leader of all racing engineering. The conquest of the old Delage cars means nothing, for they were weary with that stiffening which comes with age, alike to machines as to men, but the failure to finish of the Peugeots is a very different matter. Granting that they were older than the Stutz and Duesenberg cars, they are still running as fast as ever before, and the only explanation of their collapse, one after another, is that they were run off their feet, so to speak, by the superior stamina of their American competitors. The race gave precisely the same impression to the beholder as did the French grand prix of 1914, where the Mercedes team ran with such regularity, and so fast that the Peugeots were unable to keep up with them.

Materials of Construction Important

In all racing cars the aim is to work every bit of metal at the extreme limit which it will withstand for the duration of the race, and most cars will support a burst of speed for 10 miles or so which they cannot maintain for 100 miles. In a long race a car is driven as much below its maximum as will suffice, and is only forced to the limit as a last resource. Thus when we see all the Peugeots eliminated in the effort to hang on to the Stutz it can only be argued that the latter were capable of sustaining greater stresses for longer periods.

This means that American steel makers have found materials at least as good as and perhaps better than the famous B. N. D. steels of which the Peugeots are composed so largely, and this is at least as important a thing for the American automobile industry, as is knowledge that American engineers can equal the French in excellence of design.

It is quite possible that one of the difficulties which always present themselves when the attempt is made to keep an old racing car up to its original form when it is far from the land of its origin, is that of finding the proper steel to replace broken or fatigued parts. It is undoubted that the Peugeots which competed last week, and the Mercedes with which De Palma won the Indianapolis race contain the finest steel that Europe has ever produced, mostly of German manufacture, for the Derhion brothers who prepared B. N. D. bought largely from German sources of supply. A glance at the sectional drawing of the Stutz engine gives an idea of the intensity of stressing in every part, and it is at least as great as that prevailing in any foreign motor.

What Is the Limit?

Boillot, the celebrated French driver and engineer discussing the new cars of 1914 with THE AUTOMOBILE'S Paris correspondent shortly before the Lyons race told him that it had been "very difficult to get more power than last year." In that contest the Peugeots and Mercedes had little to choose between them on the score of maximum power, and it is probable that the Stutz motors even, have not quite equalled the *maximum* figure of either, but the Mercedes won in France because it could *endure* and now the Stutz have won for precisely the same reason.

The sixteen-valve engine has brought us to a point where there are two questions to be faced, can we get more maximum power from a cylinder of given size and if we can, shall we be able to find materials to stand the stress?

To sidetrack the question of the motor, for a moment, an interesting study is the much better showing of the leaders in the races of this year, compared with that of the other

cars which contrived to finish within the prize list. Why is it that the speed of the winner is always so *very* much greater than the average speed? In every race on a speedway this year the cars have separated into bunches capable of division into three main crowds, the leaders, the middle men and the tail, and there have been duels between car and car in each class. Of course, in attempting to explain this, only very broad conclusions can be reached, but it is at least a fact that usually we see the entirely special cars in front, the cars with specially designed motors but not special chassis, in the middle group, and the cars with neither highly special motor nor special chassis in the tail.

Take a concrete example and contrast the appearance of the Peugeots and the Stutz with the Duesenbergs. The former have the lines of a thoroughbred from radiator to rear and their stripped chassis have the mechanical beauty of the motor continued throughout the transmission. The Duesenbergs have an engine of the highest class, but regarding either the chassis or the car complete it cannot be doubted but that the motor is wasting more of its wonderful power in mechanical or in air friction. Give the Duesenberg sixteen-valve motor a chassis as good as the Peugeot and it would show itself still more capable.

In concentration upon the motor the chassis is always liable to be neglected; it has been neglected by touring car engineers and by the makers of racing cars, with a few exceptions. Really, it is the truck men who have done most toward chassis development for the circumstances of their business forced it on them. This present season has seen a wonderful cleaning up of passenger car chassis with elimination of much needless detail, and the proof is there for any who care to appreciate it that the racing cars of 1916 will need as much study in the chassis as in the motor.

Approaching the Limit of Power

Much motor development in the near future is unlikely. Since the coming of the sixteen-valve engine, now nearly three years ago, the struggle has been, not so much to get power from it, as to make it able to contain that power without breaking. If the 300 cu. in. motor remains the 1916 size, any more power that is got from it will be a very small amount, probably 2 or 3 per cent at most, and even that is a good deal to hope for.

So the obvious thing to do is to try to devise means for using the power we know we can get safely with the minimum of waste. Lighter chassis would help, not that weight makes much difference when a car is running at full speed, but it does affect acceleration vastly. Watching the Astor Cup race it was easy to see how acceleration was of value in enabling a fast car to slip by a slower one in the most favorable spot, and often passing was prevented for half a lap or more solely by the inability of the faster cars to accelerate quite rapidly enough.

A week ago one might have written that lighter weight would reduce the time lost in tire changing, but when eight cars finish a record-breaking race with only two tire changes between the lot of them, this becomes of less importance. Though, of course, had the season been August the tire changes must have been more frequent.

During the race, two of the Peugeots were pushed in to the pits some considerable distance. Just before the race Resta was observed to place the front wheels of his car dead on the starting line by a gentle pressure of one hand which moved the car forward about a foot. This lightness of "rolling" is not peculiar to the Peugeot, as the Stutz and various other cars are almost, if not quite as free, but it stands out in high relief by comparison with the effort needed to push the average racing machine as seen on the speedways. It means that not a bearing in the transmission, not a ball race in the wheels but is perfectly adjusted and perfectly lubricated, and it means miles an hour more at high speed. Put the Peugeot motor in some of the chassis that are considered good enough for first rank racing, and the car's maximum speed would be less than 100 m.p.h., its acceleration cut in two, and its reliability also halved.

Prediction is dangerous, as so many surprises occur in automobile engineering, but the 1916 season *ought* to show an increase of average speed more on account of chassis development than because of motor innovations.

Failures Mostly of Material

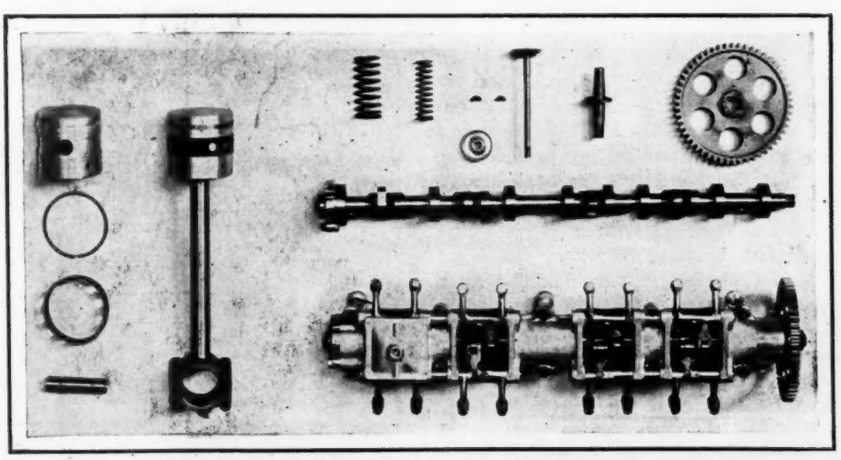
Had the Peugeots been new cars it would instantly have been said that their connecting-rod design was too weak, but we know from past records that this most certainly is not true. Ralph De Palma was eliminated by a broken ball bearing in the motor, yet hundreds of similar bearings have run thousands upon thousands of miles at racing speeds without a sign of trouble. Two or three valves or valve rockers broke, yet scores of others ran through the whole race as they had run through others. So it is not just to blame upon the design any one of these accidents.

Actually blame is not to be used for any failure in machines so highly stressed, rather than saying that the steel in the broken parts was not good we should say that the material of those that did not break was marvelous. But the lesson to be read is that we could do with still stronger steel, our engines develop a trifle too much power.

If any man had doubt of the aluminum alloy piston he ought now to be convinced that he need no longer hesitate. During this year's racing it has given much less trouble than did the best steel pistons in European contests during 1913 and 1914. The alloy piston is no lighter than the steel, it is *more reliable when of equivalent weight;* that is why it is now common on the speedway, and this may easily be written down as the most striking development of the year.

It follows along the line of the foregoing reflections, in that the aluminum alloy has proved to be a better material for making pistons than anything we had before. Its discovery has increased the reliability of the sixteen-valve motor. Perhaps we shall find next year that the aluminum alloy cylinder is also to play a part, that the better heat conductivity of aluminum may be utilized, so as to reduce the temperature of the valves, for instance. Time alone will show, but it is a line of development that is being followed by some and closely watched by others.

Another great development of the year is that of ignition,



Details of valve gear and reciprocating parts of Stutz motor

for this has been an outstanding trouble ever since the sixteen-valve engine was first used. This type of motor having more power per cubic inch of displacement has also a higher working temperature, so that spark plugs suffered in consequence. Throughout the 1913-1914 European racing season only two or three manufacturers of cars were able to keep the plugs in working condition for any length of time, similarly at Indianapolis this year, plug trouble was frequent, but at Chicago it had lessened and did not attack the Sheepshead Bay leaders. Plugs used at present are practically no better than those used six months ago, the difference is in the method of their use. Very high pressure motors need very copious supplies of oil and, if the oil comes into contact with any part that is exceptionally hot, it will carbonize promptly. Thus if the tip of the spark plug happens to be the hottest point in the combustion space it will soot up easily.

To overcome this difficulty there are two courses open; one is to prevent oil from reaching the plug and the other to keep it cool. In the most successful motors both precautions are taken and the plugs are mounted in the center of the cylinder head. In this situation they can be surrounded entirely by water, with only a thin wall of cast iron for the heat to penetrate, and also they are at the point most distant from the periphery of the piston, which is the line past which the oil comes. A plug placed horizontally in the side of the head is right in the line of fire of the oil, and any which does reach it has a lesser opportunity for draining off again, but it may be equally well cooled. A plug located in a valve cap, and so insulated from the cooling water by a thick section of metal, has a harder duty to perform, and if it is also horizontal it is in the worst case possible. These things have been found out slowly, but the principles now find general acceptance and their adoption has produced the satisfactory results now obtained.

Carburetion has changed very little this year. There have been no new wonders in the gas-making field and no great changes in carbureter construction. It is noteworthy that America is now producing carbureters which will compete with the Claudel in power supply, but apart from this there is little to chronicle.

Lubrication also has provided no surprises, the oil employed is almost always a derivative of castor oil of some kind, sundry trifling details of design have helped to prevent oil sent to an overhead camshaft from flooding the valves, and means have been found for ensuring a proper supply of oil to the crankpin bearings in motors with ball bearings on the main crankshaft journals. All these being small matters of individual detail and not questions of principle.

To what extent the increasing use of ball bearings is due to the desire for compactness and elimination of three bearings requiring high pressure lubrication, and to what extent it is mere blind Peugeot imitation would be very difficult to say. The mere fact that Peugeot have used ball bearings sways the mind of the best of engineers when deciding which he will adopt, and it is safe to say that ball bearings would have been employed in the majority of ordinary automobile motors to-day, were it not for the noise which seems to be inseparable from their use.

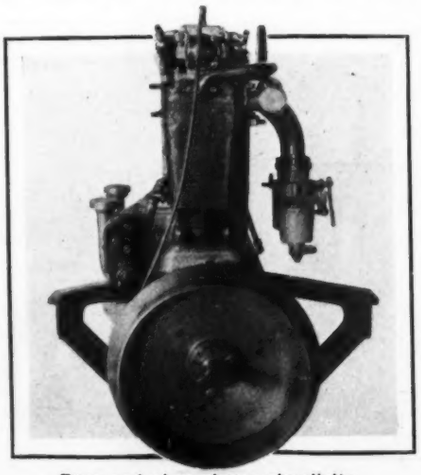
To sum up, the racing season has consolidated the position of the sixteen valve motor introduced by Peugeot in 1913. It has proved American automobile engineering to be able to meet and beat the foreigner. It has established knowledge of materials not possessed before. It has seen no great mechanical novelties, but it has developed and brought to a high pitch of perfection the most modern type of engine.

Stutz Racing Motor Has Light Parts

Large Valve Opening—Many Ball Bearings—Centrifugal Lubrication and Two-Piece Crankshaft, Features of Design

MADE by the Wisconsin Motor Co., Milwaukee, Wis., the Stutz racing engines which have performed so wonderfully well this year, rank with the very finest racing creations of Europe and are now leaders of the whole world. Yet, a glance at their drawings shows that simplicity is a characteristic, that few parts and very light proportions everywhere are the rule. The bore is 3 13/16 in. and stroke 6½ in., giving a total capacity of 296.81 cu. in. or 74.2 cu. in. per cylinder. The maximum power is obtained at a piston speed of 3250 ft. per min., which corresponds to 3000 r.p.m., and is about 130 hp., as shown by block test in the maker's plant. This is practically 0.44 hp. per cu. in. displaced, or 1 hp. per 2.2 cu. in. The brake mean effective pressure which is usually known as ηp is 115 lb. per sq. in. at maximum hp. and has then fallen off a good deal. At just over 2000 ft. per min. piston speed it begins to droop, the value of ηp below this speed being over 130 lb. per sq. in. These figures compare extremely well for the values quoted for foreign engines.

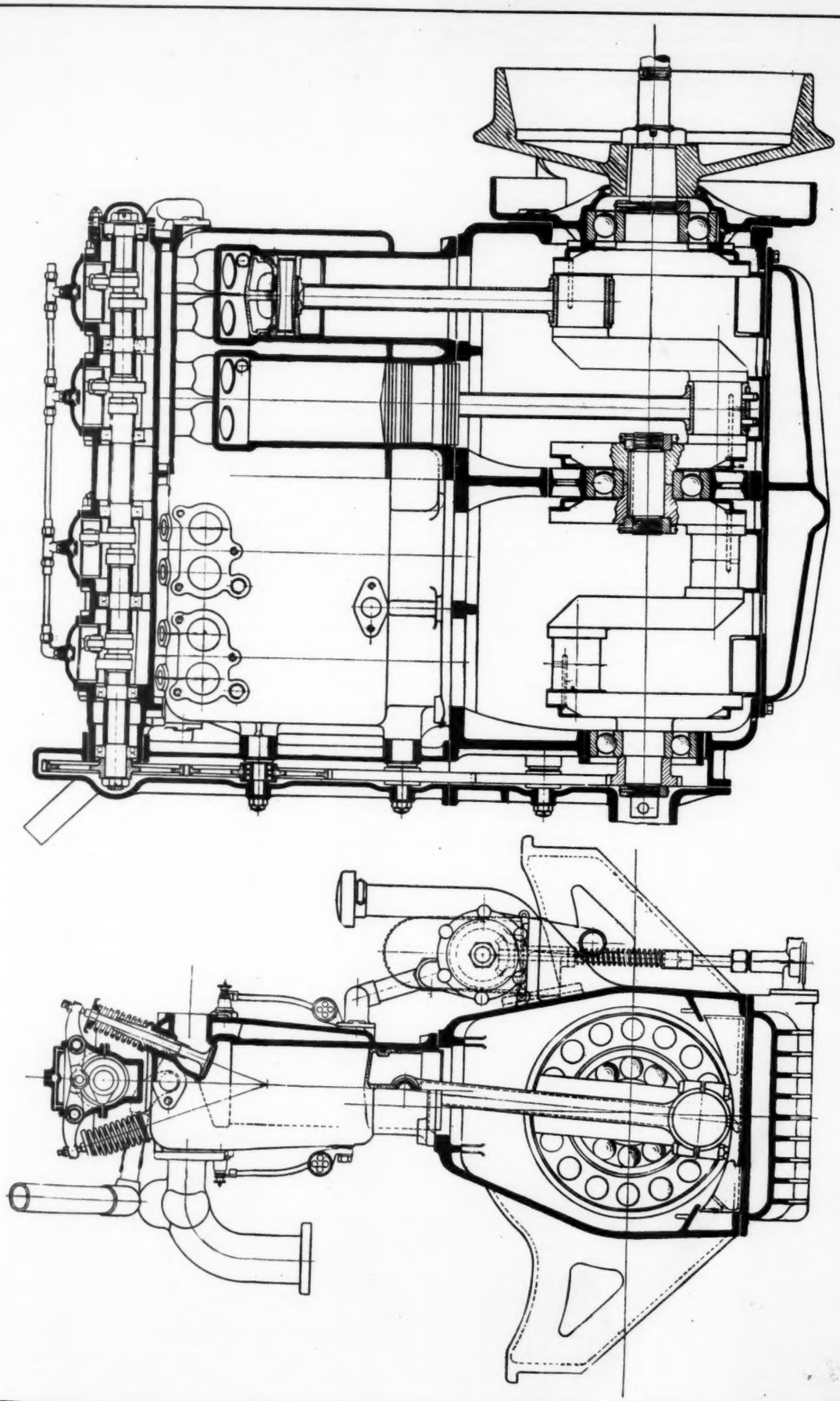
Each of the four valves is over 1.5 in. in diameter. as the port behind the valve has this dimension. The area of the port is 1.767 sq. in. and the lift of the valve ⅜, which gives a peripheral opening of exactly the same value as the port area. Meanwhile as the area of the piston is 11.4 sq. in. and that of the two valves together 3.534 sq. in. the speed of the intake gas at the crankshaft speed corresponding to maximum power is (in round figures) 180 ft. per sec. This is far from a high velocity as many touring car motors are designed on a basis of 200 ft. per sec.



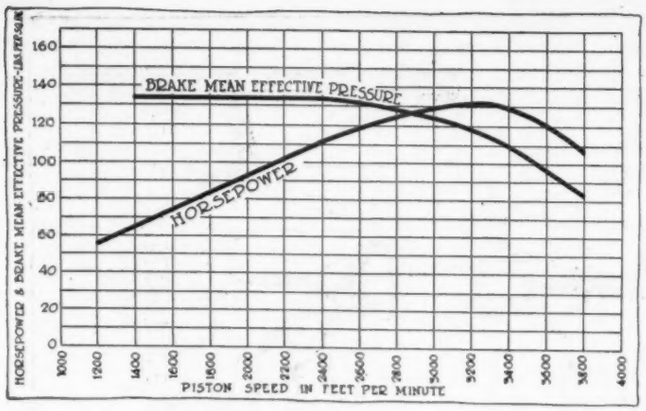
Rear end view shows simplicity

Perhaps the most remarkable feature of the design, as seen in the section, is the extraordinary smallness of the spur gears that drive the camshaft. These have a width of face of only 0.5 in. and their pitch line velocity is 2650 ft. per min. at a crankshaft speed of 3000.

The crankpins are 2.25 in. diameter and the lower end bearings 2⅜ in. wide, the babbitt metal being run straight into the ends of the hollow connecting-rods. The way in which the two halves of the crankshaft are held together is shown in the section, and it may be noted that the balls in the bearings are 1 in. diameter. Of course the use of a divided shaft makes the assembling simple and, much more important, al-



SECTIONAL VIEWS OF WISCONSIN-STUTZ RACING MOTOR 3 13/16-IN. BORE AND 6 1/2-IN. STROKE


BRAKE MEAN EFFECTIVE PRESSURE
HORSEPOWER
HORSEPOWER & BRAKE MEAN EFFECTIVE PRESSURE-LBS PER SQ IN
PISTON SPEED IN FEET PER MINUTE

Curves showing horsepower and brake mean effective pressure plotted against piston speed in feet per minute

lows the employment of a fairly small diameter ball race. At the bottom of the groove the diameter is about 3 in., so that the peripheral velocity at full power is only 2300 ft. per min. which is not excessive.

The life of a ball bearing is affected vitally by the speed at which the balls roll and if a solid crank were used, in which the center bearing had to be "threaded" into place, the velocity would need to be at least twice as great.

Lubrication Is Simple

For a racing motor the lubrication seems almost absurdly simple. Each lower end carries two splash dippers which are backed by holes that lead directly to the crankpins, but each crank web also carries a gutter ring whence oil is forced by centrifugal pressure through small holes drilled in the pins. So there are three supply holes to each lower end bearing, their diameter being approximately 3/16 in.

Overhead, the camshaft has a ball bearing between each set of cams, and over the top case is a header which throws a copious stream of oil directly upon the cams and the roller ends of the rocker arms. From the camshaft case excess lubricant drains back to the crankcase. Like the crankshaft and camshaft, the timing gears are also mounted on ball bearings, so the only plain bearings in the whole motor are the lower ends and the piston pins. The latter are interesting in that the pin is fixed neither to the piston nor the rod, but is free to move in either.

In the longitudinal cut it may be noticed that small oil holes lead to the ends of the piston pins from points just beneath the single ring. The piston shown in the drawing is steel made on the same principle as the Sunbeam, with a center leg to rest against the wristpin and act as a heat conductor to aid in keeping cool the center of the piston head. Magnalite pistons were used in the race and one of these is shown in the photographic illustration. There it may be seen that the wristpin is constrained against endwise movement by a thin steel ring slipped over the middle of the piston.

Very Simple Crankcase

The designers are to be complimented upon the idea of putting the oil pump outside the crankcase for two reasons. Firstly, it enables the case to be designed solely from the viewpoint of rigidity, and allows that rigidity to be obtained with a minimum of metal; the drawings are enough to show how very strong the section of the crankcase is.

Secondly, having the pump external and in the free atmosphere must have a quite considerable influence on the temperature of the oil. It may also be observed that the quantity of oil actually carried in the base chamber is quite small, and the latter is ribbed deeply for cooling purposes. It is thought, from Peugeot experience, that a continuous supply of fresh, unused oil is necessary for racing motors of this type, where high pressure feed to the lower end bearings is an impossibility. This Wisconsin-Stutz holds just about enough oil internally for the maintenance of circulation and the fresh supply is enough to control the temperature.

Harry Grant, Twice Vanderbilt Winner, Dies of Burns

NEW YORK CITY, Oct. 8—Harry F. Grant, twice winner of the Vanderbilt cup race, died last night in the Coney Island Hospital as the result of burns he suffered on Sept. 28 when his Maxwell took fire at the Sheepshead Bay Speedway.

Grant's death comes as a surprise, as it had been reported only a few days ago that he was recovering.

The accident which caused his death occurred just after he had completed one circuit of the 2-mile track on a practice spin. As he went up the banked turn on his second practice lap his car suddenly was enveloped in flames. Situated as he was on the bank of the track, it was impossible for him to apply the brakes and instead he kept his car, which was going faster than 90 m.p.h., under control until he passed the curve. Then he jammed on the brakes.

HARRY GRANT

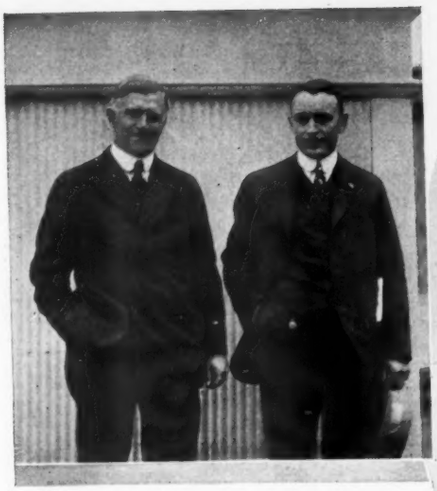
One of the most famous of American automobile racing drivers died on Thursday night, Oct. 8, in the Coney Island hospital due to the burns sustained in a practice spin at the Sheepshead Bay motor speedway on Sept. 28 preliminary to the Astor cup race and after he had qualified his Maxwell for the great contest. Grant's long racing career was chiefly distinguished by his winning of the Vanderbilt cup race in 1909 and 1910, the only time this contest has been captured by the same driver twice in succession, although he won a number of other important races

The fire was due to a loosened gasoline line and a backfire at the carbureter. The car was only slightly damaged.

Grant's racing career, which began in 1907, was brilliant and free from accidents. His only other serious mishap was at Corona last fall, when one of his wheels broke while traveling in a race at 95 m.p.h. The car turned over and burst into flames when the gasoline tank was rent, but Grant escaped unhurt. Another misfortune overtook him in California in a Vanderbilt Cup race, when one of his helpers filled his gasoline tank by accident with water at a crucial moment in the race, putting the car out of commission.

Harry Grant was born in Cambridge, Mass., in 1877. While a young man he became interested in automobiles and worked for several years as a salesman and demonstrator in the Boston offices of the Alco company. In 1907 he started racing on small dirt tracks. His success encouraged him to enter the Lowell road race in 1908 and he made the fastest lap in the contest. A tire explosion lost the 1909 Lowell race for him.

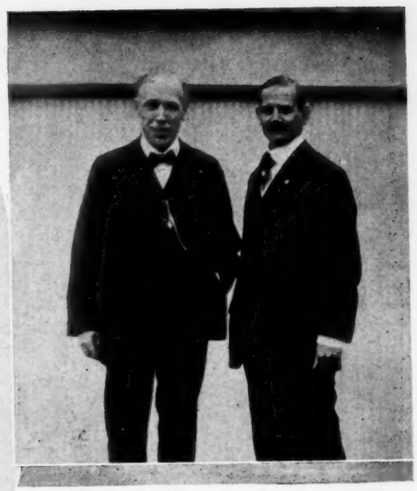
In 1909 and 1910 on a Long Island course he won the Vanderbilt Cup race, each time driving an old stock Alco car. He is the only driver who ever won two Vanderbilts in succession. One other driver, Ralph De Palma, has won two Vanderbilt Cup races. Grant is survived by his wife.



Wm. T. White
Pres. Mercer Automobile Co.

Harry C. Stutz
Pres. and Gen. Man. Stutz Motor Car Co.

Chas. Clifton
Treasurer Pierce-Arrow Motor Car Co. and Pres. N. A. C. C.



Samuel A. Miles
National Show Mgr.

Alfred Reeves
General Manager of N. A. C. C.

N.A.C.C. Allots Show Space

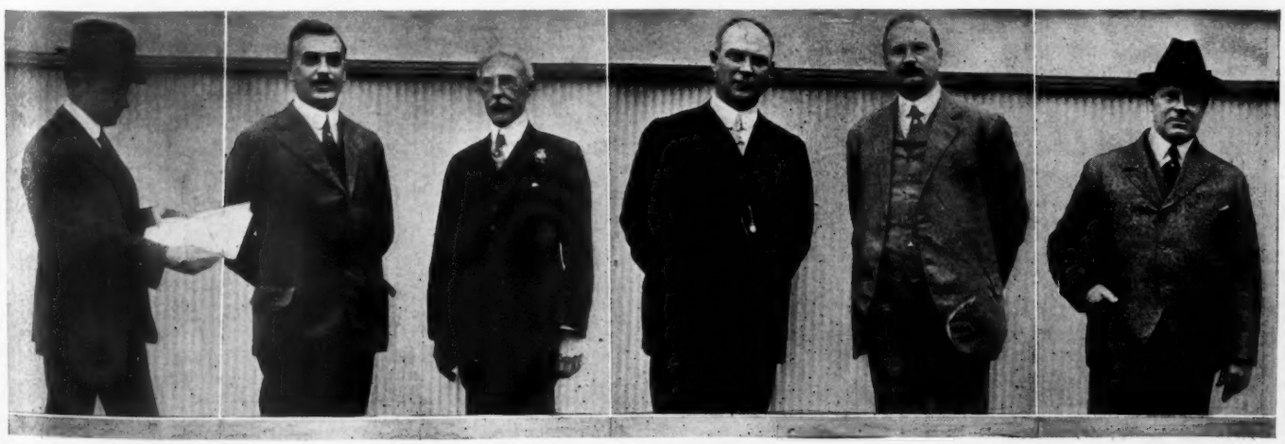
NEW YORK CITY, Oct. 8—The meeting of the National Automobile Chamber of Commerce, Inc., for the drawing of exhibit spaces at the New York and Chicago shows proved one of the biggest from number point of view of the year. Practically all the members of the association had their representatives present to look after the drawing of space, and when the members had drawn an opportunity was given non-members to secure whatever space was remaining at the Palace and Coliseum shows. Before the drawing took place a spirited discussion occurred as to whether the order of drawing should be in proportion to the total amount of sales made by the different companies during the year ending June 30, 1915, or whether the order should be based on the volume of passenger car business only, truck business being excluded. Heretofore the drawing has been in proportion to the total volume of passenger car and truck business. When the vote was taken it was found that majority favored including a passenger car business only as passenger cars only are on exhibition. Truck manufacturers contended in the debate that according to precedent the trucks should be included. The new ruling made considerable difference in the drawing and placed several concerns whose truck business is greater than the passenger car business some distance down on the list, whereas formerly they were up in the first ten.

The honor of selecting the first position for both shows fell to C. S. Jameson, of the Willys-Overland Co., the report showing this company the leader in the volume of business for the year, a position it has now held for the third season. Following Overland came Buick, Studebaker, Cadillac, Maxwell, Hudson, Reo, Dodge, Chalmers, Hupmobile, Packard, Pierce, Paige, Franklin, Chandler and Saxon.

Electric cars allotted space were Anderson, Baker, R. & L., Ohio, Milburn, Waverley and Woods.

In all seventy-five different car concerns secured space at New York, these not including probably six electric makes which will occupy a prominent space in one group on the second floor. Compared with the drawing a year ago, the number of makes is not quite so large, ninety-five makers securing space at that time. Practically all of the available exhibit spaces have been taken with about three exceptions, this number of spaces remaining open on the third floor.

There are a few new names in the show



W. C. Marmon
Pres. Nordyke & Marmon Co.

Wm. E. Metzger

J. C. Schmidt
Pres. Pullman Motor Car Co.

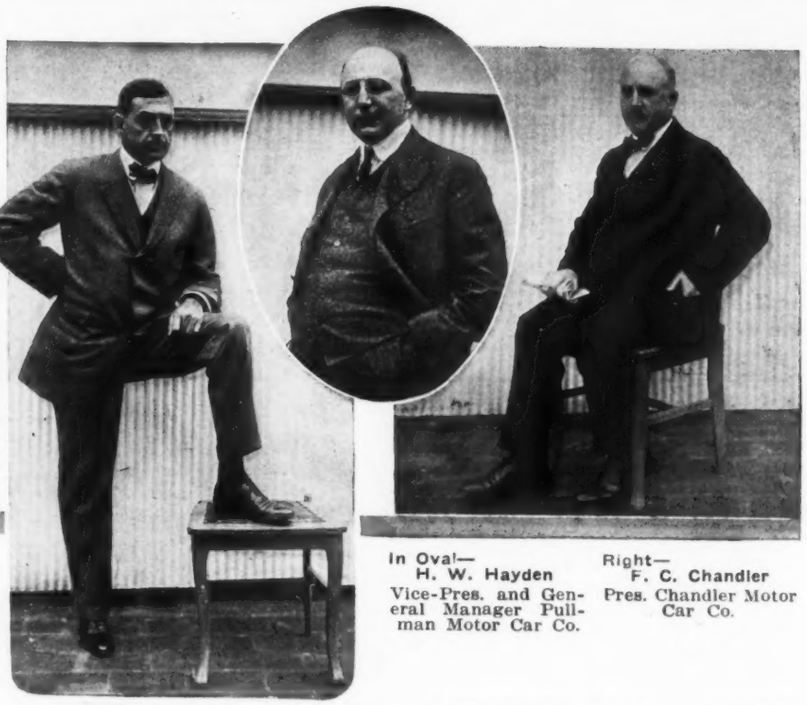
W. H. Vandervoort
Pres. Moline Automobile Co. and Pres. S. A. E.

C. C. Hanch
Treas. Studebaker Corp. and Director N. A. C. C.

E. S. Jameson
Vice-Pres. Willys-Overland Co.

Left—
Harry W. Ford
Pres. Saxon Motor Co.

Right—
H. M. Jewett
Pres. Paige-Detroit Motor Car Co.



In Oval—
H. W. Hayden
Vice-Pres. and General Manager Pullman Motor Car Co.

Right—
F. C. Chandler
Pres. Chandler Motor Car Co.

this year including All-Steel, Empire, Grant, Sterling, Sun and Trumbull. While these new names have appeared others have dropped from the list. Among those missing for the 1916 show being Cartercar, Crawford, Krit, Lyons-Atlas, S.G.V., Speedwell, Herreshoff, McIntyre, Partin-Palmer, Sphinx, Cresson-Morris and Mack.

There are sixty-three members of the association who were in on the original drawing, their order of drawing being in proportion to the amount of business done. After these came five members who have recently joined the organization and when these had secured space, non-members were given an opportunity, among those drawing being All-Steel, Davis, Empire, Enger, Herff-Brooks, Lewis, Metz, Owen, Remington, Standard, Sterling, Sun and Trumbull.

Practically the same space arrangements will prevail in Grand Central Palace, New York, as have been used in the past. The main floor second floor, and a goodly portion of the third floor of the building will be used for car exhibits. Accessories will be on the third and fourth floors. In Chicago the show will be held in three buildings, the Coliseum, Coliseum Annex and the First Regiment Armory, the cars having practically the same space as formerly.

The complete list of car exhibitors at the New York and Chicago shows follows:

Car Exhibitors at New York

Main Floor—Automobile Section

Briscoe Motor Co.....Jackson, Mich.
Buick Motor Co.....Flint, Mich.
Cole Motor Car Co.....Indianapolis, Ind.
Chalmers Motor Co.....Detroit, Mich.
Cadillac Motor Car Co.....Detroit, Mich.
Chandler Motor Car Co.....Cleveland, Ohio
Chevrolet Motor Co.....Flint, Mich.
Dodge Brothers.....Detroit, Mich.
Franklin Machine Co.....Brooklyn, N. Y.
Hudson Motor Car Co.....Detroit, Mich.
Hupp Motor Car Co.....Detroit, Mich.
Haynes Automobile Co.....Kokomo, Ind.
Jeffery Co., Thos. B.....Kenosha, Wis.
Kissel Motor Car Co.....Hartford, Wis.
King Motor Car Co.....Detroit, Mich.
Locomobile Co. of America.Bridgeport, Conn.
Mitchell-Lewis Motor Co.....Racine, Wis.
Nordyke & Marmon Co.....Indianapolis, Ind.
Maxwell Motor Co.....Detroit, Mich.
Oakland Motor Co.....Pontiac, Mich.
Willys-Overland Co.....Toledo, O.
Olds Motor Works.....Lansing, Mich.
Paige-Detroit Motor Car Co...Detroit, Mich.
Pierce-Arrow Motor Car Co....Buffalo, N. Y.
Packard Motor Car Co.....Detroit, Mich.
Regal Motor Car Co.....Detroit, Mich.
Reo Motor Car Co.....Lansing, Mich.
Saxon Motor Co.....Detroit, Mich.
Studebaker Corp.....Detroit, Mich.
Velie Motor Veh. Co.....Moline, Ill.
Winton Motor Car Co.....Cleveland, Ohio
White Co. .....Cleveland, Ohio

Second Floor—Automobile Section

Apperson Bros. Auto Co.....Kokomo, Ind.
Allen Motor Co.....Fostoria, Ohio.
Auburn Automobile Co.....Auburn, Ind.
Case T. M. Co., J. I.....Racine, Wis.
Cunningham Son & Co., Jas..Rochester, N. Y.
Fiat Co.....Poughkeepsie, N. Y.

Artemus Ward, Jr.
Pres. King Motor Car Co.

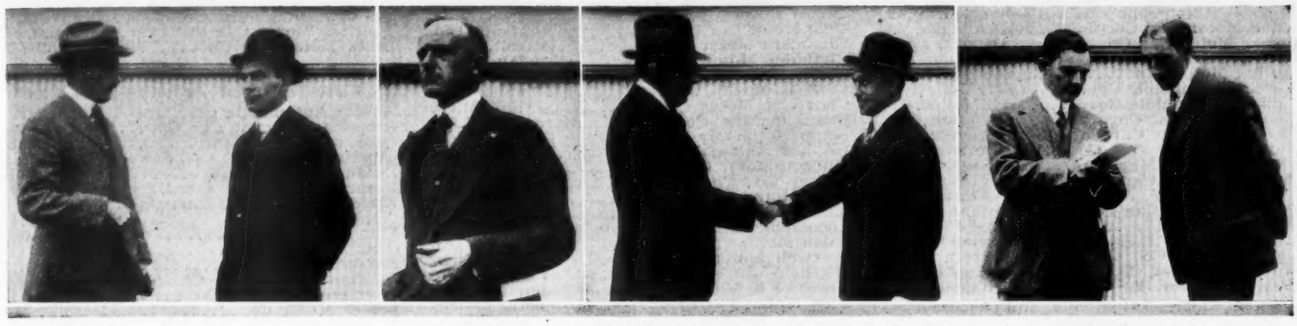
Roy D. Chapin
Pres. Hudson Motor Car Co. and Sec. of N. A. C. C.

Hugh Chalmers
Pres. Chalmers Motor Car Co., Vice-Pres. Gasoline Division N. A. C. C.

J. W. Moon
Pres. Moon Motor Car Co.

Ezchas Syrmz

R. E. Olds
Pres. Reo Motor Car Co.



Lincoln Reimer
Sterling Auto Mfg. Co.

Chas. Chambers

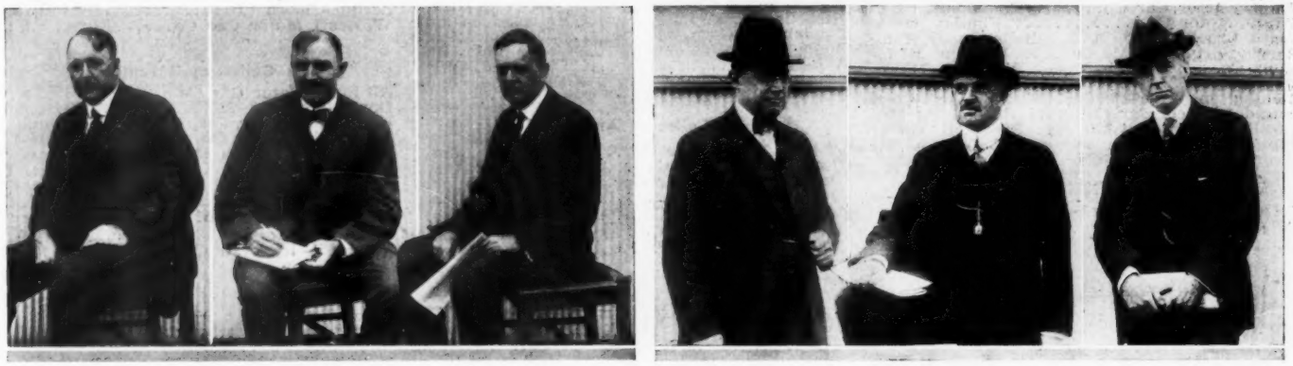
H. P. Mammen
Westcott M. C. Co.

O. C. Friend
Mitchell-Lewis M. Co.

Carl Page
Mitchell Agent

A. B. Poertner
N. Y. National Agent

G. M. Dickson
General Manager National M. V. Co.



E. P. Chalfant
Anderson Elec. Car Co.

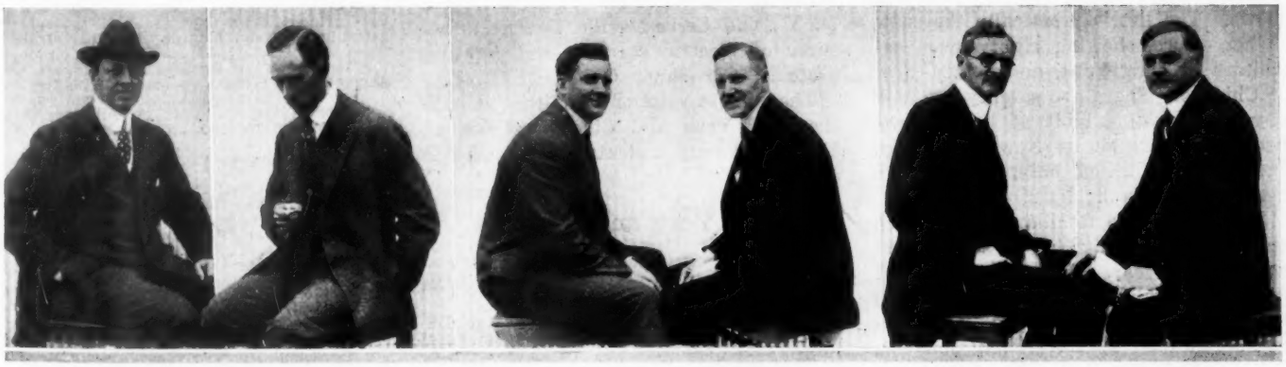
B. W. Twyman
Inter-State M. Co.

V. E. Gustavson
Woods Motor Veh. Co.

H. A. Martin

W. H. Schwartz
Sales Manager Metz Co.

J. S. Clarke
Vice-Pres. Autocar Co.



F. H. Dodge
Milburn Wagon Co.

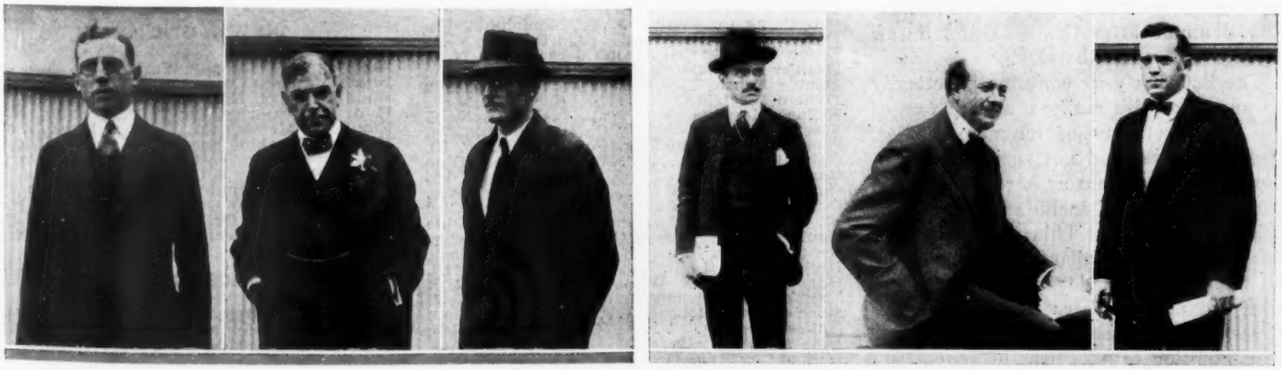
F. C. Carter
Herff-Brooks Corp.

C. H. McCausland
Kissel M. C. Co.

Wm. Graham
McFarland M. C. Co.

C. A. Emise
Vice-Pres. Chandler M. C. Co.

Benjamin Briscoe
Pres. Briscoe M. Co.



Paul Smith
Gen. Sales Manager Chalmers M. C. Co.

Horace Delisser
Vice-Pres. Briscoe M. Co.

A. Holmes
H. Franklin Mfg. Co.

A. Fisk
Remington Motor Co.

Guy Monihan
Mutual Motors Co.

Tom Jones
Empire Automobile Co.

Inter-State Motor Co.....Muncie, Ind.
Jackson Automobile Co.....Jackson, Mich.
Kline Motor Car Corp.....Richmond, Va.
Lozier Motor Car Co.....Detroit, Mich.
Lexington-Howard Co.....Connorsville, Ind.
Mutual Motors Co.....Jackson, Mich.
Mercer Automobile Co.....Trenton, N. J.
Moline Automobile Co.....E. Moline, Ill.
Moon Motor Car Co.....St. Louis, Mo.
McFarlan Motor Car Co....Connersville, Ind.
National Motor Veh. Co....Indianapolis, Ind.
Premier Motor Mfg. Co....Indianapolis, Ind.
Pullman Motor Car Co.....York, Pa.
Paterson Co., W. A.....Flint, Mich.
Peerless Motor Car Co.....Cleveland, Ohio
Pathfinder Co.....Indianapolis, Ind.
Stearns Co., F. B.....Cleveland, Ohio
Scripps-Booth Co.....Detroit, Mich.
Stutz Motor Car Co.....Indianapolis, Ind.
Westcott Motor Car Co.....Richmond, Ind.

Third Floor—Automobile and Accessory Section

American Elec. Car Co.....Saginaw, Mich.
Austin Automobile Co...Grand Rapids, Mich.
All-Steel Motor Car Co.....St. Louis, Mo.
Consolidated Car Co.....Detroit, Mich.
Davis Motor Car Co.....Richmond, Ind.
Empire Automobile Co.....Indianapolis, Ind.
Enger Motor Car Co.....Cincinnati, Ohio
Grant Motor Co.....Findlay, Ohio
Herff-Brooks Corp.....Indianapolis, Ind.
Lewis Spring & Axle Co.....Jackson, Mich.
Metz Co.....Waltham, Mass.
Owen & Co., R. M.....New York City
Remington Motor Co.....New York City
Standard Steel Car Co.....Pittsburgh, Pa.
Sterling Motor Car Co.....Brockton, Mass.
Sun Motor Car Co.....Buffalo, N. Y.
Trumbull Motor Car Co....Bridgeport, Conn.

Car Exhibitors at Chicago

Coliseum Main Floor—Automobile Section

Allen Motor Co.....Fostoria, Ohio
Apperson Bros. Auto Co.....Kokomo, Ind.
Briscoe Motor Co.....Jackson, Mich.
Buick Motor Co.....Flint, Mich.
Cole Motor Car Co.....Indianapolis, Ind.
Chalmers Motor Co.....Detroit, Mich.
Chandler Motor Car Co.....Cleveland, Ohio
Cadillac Motor Car Co.....Detroit, Mich.
Case T. M. Co., J. I.....Racine, Wis.
Chevrolet Motor Co.....Flint, Mich.
Franklin Mfg. Co.....Syracuse, N. Y.
Hupp Motor Car Co.....Detroit, Mich.
Haynes Automobile Co.....Kokomo, Ind.
Hudson Motor Car Co.....Detroit, Mich.
Jeffery Co., Thos. B.....Kenosha, Wis.
King Motor Car Co.....Detroit, Mich.
Kissel Motor Car Corp.....Richmond, Va.
Locomobile Co. of America..Bridgeport, Conn.
Moon Motor Car Co.....St. Louis, Mo.
Maxwell Motor Co.....Detroit, Mich.
Mitchell-Lewis Motor Co.....Racine, Wis.
Nordyke & Marmon Co....Indianapolis, Ind.
Olds Motor Works.....Lansing, Mich.
Oakland Motor Co.....Pontiac, Mich.
Willys-Overland Co.....Toledo, Ohio
Packard Motor Car Co.....Detroit, Mich.
Pierce-Arrow Motor Car Co....Buffalo, N. Y.
Paige-Detroit Motor Car Co...Detroit, Mich.
Regal Motor Car Co.....Detroit, Mich.
Reo Motor Car Co.....Lansing, Mich.
Saxon Motor Co.....Detroit, Mich.
Stearns Co., F. B.....Cleveland, Ohio
Studebaker Corp.....Detroit, Mich.
Velie Motor Vehicle Co.....Moline, Ill.
White Co.....Cleveland, Ohio
Winton Motor Car Co.....Cleveland, Ohio

Coliseum Annex

Auburn Automobile Co.....Auburn, Ind.
Crow Motor Car Co.....Elkhart, Ind.
Detroiter Motor Car Co.....Detroit, Mich.
Dodge Bros.....Detroit, Mich.
Inter-State Motor Co.....Muncie, Ind.
Mercer Automobile Co.....Trenton, N. J.
Mutual Motors Co.....Jackson, Mich.
National Motor Vehicle Co..Indianapolis, Ind.
Pullman Motor Car Co.....York, Pa.
Peerless Motor Car Co.....Cleveland, Ohio
Stutz Motor Car Co.....Indianapolis, Ind.

First Regiment Armory—Main Floor

Austin Automobile Co...Grand Rapids, Mich.
American Electric Car Co....Saginaw, Mich.
Consolidated Car Co.....Detroit, Mich.
Cunningham Son & Co., Jas..Rochester, N. Y.
Davis Motor Car Co.....Richmond, Ind.
Empire Automobile Co.....Indianapolis, Ind.
Elkhart Carriage & Harness Mfg Co., Elkhart, Ind.
Fiat Co.....Poughkeepsie, N. Y.
Grant Motor Co.....Findlay, Ohio
Bartholomew Co.....Peoria, Ill.
Jackson Automobile Co.....Jackson, Mich.
Lexington-Howard Co. ....Connorsville, Ind.
Lozier Motor Co.....Detroit, Mich.
L. P. C. Co.....Racine, Wis.
Moline Automobile Co.....E. Moline, Ill.
Metz Co.....Waltham, Mass.
McFarlan Motor Car Co....Connorsville, Ind.
Paterson Co., W. A.....Flint, Mich.
Pathfinder Co.....Indianapolis, Ind.
Premier Motor Mfg. Co....Indianapolis, Ind.
Scripps-Booth Co.....Detroit, Mich.
Westcott Motor Car Co.....Richmond, Ind.

Coliseum Basement

All-Steel Motor Car Co.....St. Louis, Mo.
Dort Motor Car Co.....Flint, Mich.
Elgin Motor Car Corp.....Chicago, Ill.
Enger Motor Car Co.....Cincinnati, Ohio
Farmac Motor Car Corp.....Chicago, Ill.
Herff-Brooks Corp.....Indianapolis, Ind.
Cummins Auto Sales Co.....Columbus, Ohio
Owen & Co., R. M.....New York City
Remington Motor Co.....New York City
Sun Motor Car Co.....Buffalo, N. Y.
Standard Steel Car Co.....Pittsburgh, Pa.

95 Accessory Firms To Exhibit

NEW YORK CITY, Oct. 8—The Motor & Accessory Manufacturers through its show committee to-day allotted exhibit spaces to ninety-five of its members for the New York and Chicago shows. The list is practically the same as heretofore, showing eighty-seven exhibitors at New York, and eighty-three at Chicago. There are seventy-five concerns that will exhibit at both shows, twelve will exhibit at New York only, and eight at Chicago only, the complete list showing this division.

There are some familiar names which appeared on the list last year, but are not on this year. Some of these are: Standard Welding Co., Springfield Metal Body Co., Coes Wrench Co., Gemmer-Detroit Starter Co., National Coil Co., Dunlop Wire Wheel Co., Bearing Co. of America, Bock Bearing Co., Golde-Patent Co. On the other hand there are some new concerns that did not appear on the list last year including John O. Heinze Co., Brunner Mfg. Co., National Screw & Tool Co., and others.

The list this year contains practically no names of tire makers, a very few of the manufacturers of magnetos, axles, steering gears, and not so many manufacturers of starters as heretofore. The names represented include the accessory field thoroughly. This list will undoubtedly be supplemented when the allotments are made to manufacturers who are not members of the Motor & Accessory Manufacturers.

In addition to allotment of space four concerns were admitted to membership, these being: Brunner Mfg. Co., manufacturer of air compressors, Utica, N. Y.; E. A. Laboratories, Inc., manufacturer of automobile electric and hand horns, Brooklyn, N. Y.; General Bakelite Co., manufacturer of Bakelite, New York, N. Y., and Leece-Neville Co., manufacturer of electric starting and lighting systems, Cleveland, Ohio.

The complete list of exhibitors at both the New York and Chicago shows, at New York only and at Chicago only is as follows:

New York and Chicago

American Bronze Co.....Berwyn, Pa.
Apple Electric Co.....Dayton, Ohio
Automobile Supply Mfg. Co..Brooklyn, N. Y.
Benford Mfg. Co.....Mount Vernon, N. Y.
Blackledge Mfg. Co., John W....Chicago, Ill.
Brown, William H.....Cleveland, Ohio
Brown-Lipe Chapin Co.....Syracuse, N. Y.
Brown-Lipe Gear Co.....Syracuse, N. Y.
Brunner Mfg. Co.....Utica, N. Y.
Buda Co.....Harvey, Ill.
Byrne, Kingston & Co.....Kokomo, Ind.
Carr Co., F. S.....Boston, Mass.
Champion Ignition Co.....Flint, Mich.
Cowles & Co., C.....New Haven, Conn.
Cramp & Sons Ship & Engine Building Co., Wm.....Philadelphia, Pa.
Detroit Lubricator Co.....Detroit, Mich.
Dixon Crucible Co., Joseph..Jersey City, N. J.
Doehler Die Casting Co.....Brooklyn, N. Y.
Double Fabric Tire Co.....Auburn, Ind.
Dyneto Electric Co.....Syracuse, N. Y.
Eclipse Machine Co.....Elmira, N. Y.
Electric Storage Battery Co.Philadelphia, Pa.
Findeisen & Kropf Mfg. Co.....Chicago, Ill.
Gabriel Mfg. Co.....Cleveland, Ohio
Garford Mfg. Co.....Elyria, Ohio
Garage Equipment Co.....Milwaukee, Wis.
General Bakelite Co.....New York City
Globe Machine & Stamping Co.Cleveland, Ohio
Gould Storage Battery Co....New York City
Gray & Davis, Inc.....Boston, Mass.
Halladay Co., L. P.....Streator, Ill.
Harris Oil Co., A. W.....Providence, R. I.
Hartford Suspension Co....Jersey City, N. J.
Hassler, Inc., Robert H....Indianapolis, Ind.
Hayes Mfg. Co.....Detroit, Mich.
Heinze Electric Co.....Lowell, Mass.
Heinze Co., John O.....Springfield, Ohio
Herz & Co.....New York City
Houk Mfg. Co.....Buffalo, N. Y.
Hydraulic Pressed Steel Co...Cleveland, Ohio
Kellogg Mfg. Co.....Rochester, N. Y.
Kent Mfg. Works, Atwater..Philadelphia, Pa.
Kokomo Electric Co.....Kokomo, Ind.
Lovell-McConnell Mfg. Co.....Newark, N. J.
Mosler & Co., A. R.....Mount Vernon, N. Y.
Motometer Co., Inc.....New York City
North East Electric Co.....Rochester, N. Y.
Oakes Co.....Indianapolis, Ind.
Pantasote Co.....New York City
Perfection Spring Co.....Cleveland, Ohio
Pittsburgh Model Engine Co..Pittsburgh, Pa.
Rose Mfg. Co.....Philadelphia, Pa.
Royal Equipment Co.....Bridgeport, Conn.
Sager Co., J. H.....Rochester, N. Y.
Schrader's Son, Inc., A.....Brooklyn, N. Y.
Schwarz Wheel Co.....Philadelphia, Pa.
Shakespeare Co.....Kalamazoo, Mich.
Shaler Co., C. A.....Waupun, Wis.
Sparks-Withington Co.....Jackson, Mich.
Spicer Mfg. Co.....Plainfield, N. J.
Splitdorf Electrical Co.....Newark, N. J.
Springfield Metal Body Co..Springfield, Mass.
Standard Thermometer Co.....Boston, Mass.
Stewart-Warner Speedometer Corp.....Chicago, Ill.
Stromberg Motor Devices Co....Chicago, Ill.
United States Light & Heating Corp.....Niagara Falls, N. Y.
Vacuum Oil Co.....Rochester, N. Y.
Van Sicklen Co.....Elgin, Ill.
Veeder Mfg. Co.....Hartford, Conn.
Voorhees Rubber Mfg. Co..Jersey City, N. J.
Waltham Watch Co.....Waltham, Mass.
Westinghouse Electric & Mfg. Co.....East Pittsburgh, Pa.
Wheeler & Schebler.....Indianapolis, Ind.
Willard Storage Battery Co..Cleveland, Ohio
Zenith Carbureter Co.....Detroit, Mich.

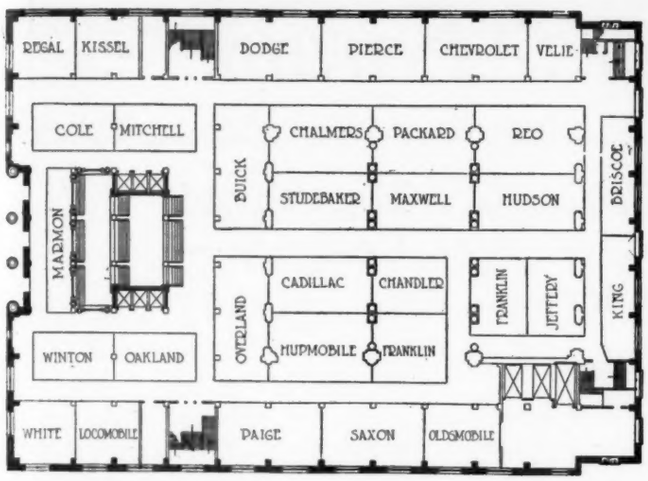
New York Only

American Ever Ready Works.New York City
Bosch Magneto Co.....New York City
Budd Mfg. Co., Edward G..Philadelphia, Pa.
E. A. Laboratories, Inc.....Brooklyn, N. Y.
English & Mersick Co.....New Haven, Conn.
Hartford Machine Screw Co..Hartford, Conn.
J. M. Shock Absorber Co., Inc.Philadelphia, Pa.
Janney-Steinmetz & Co.....Philadelphia, Pa.
Light Mfg. & Foundry Co.....Pottstown, Pa.
Motor-Compressor Co.....Newark, N. J.
Nokoloyd Signal Co.....New York City
Ward Leonard Electric Co..Bronxville, N. Y.

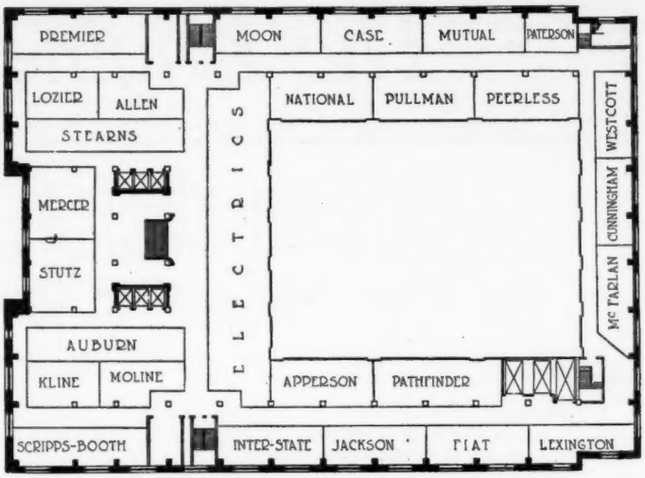
Chicago Only

Badger Brass Mfg. Co.....Kenosha, Wis.
Continental Motor Mfg. Co....Detroit, Mich.
Imperial Brass Mfg. Co.....Chicago, Ill.
Remy Electric Co.....Anderson, Ind.
Sulzberger & Sons Co.....Chicago, Ill.
Vesta Accumulator Co.....Chicago, Ill.
Warner Gear Co.....Muncie, Ind.
Waukesha Motor Co.....Waukesha, Wis.

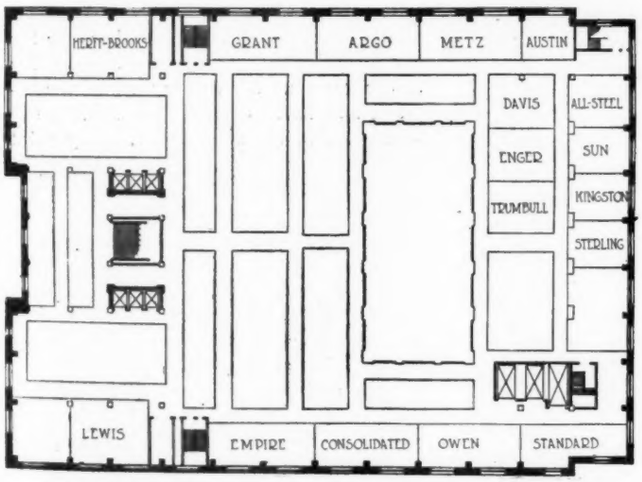
Exhibitors and Plans of New York and Chicago Shows



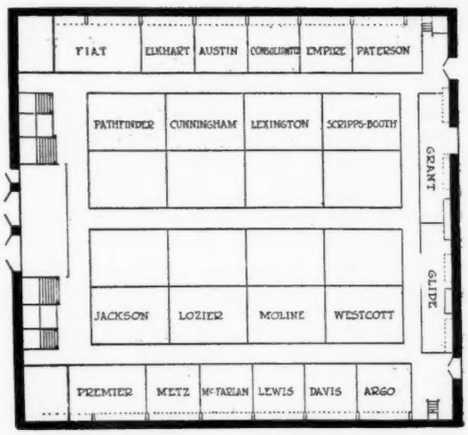
MAIN FLOOR GRAND CENTRAL PALACE, NEW YORK



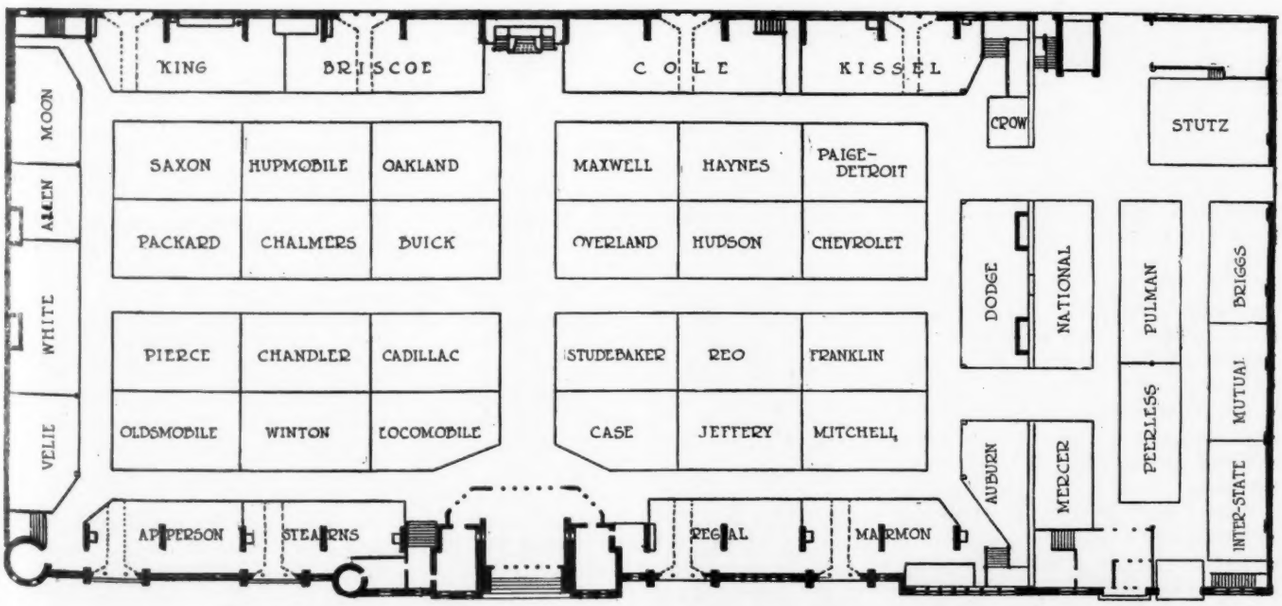
SECOND FLOOR GRAND CENTRAL PALACE, NEW YORK



THIRD FLOOR GRAND CENTRAL PALACE, NEW YORK



FIRST REGIMENT ARMORY, CHICAGO



EXHIBITORS ON THE MAIN FLOOR OF THE COLISEUM AT THE CHICAGO SHOW

The Engineers' Forum

Aluminum Pistons for Racing and High-Speed Work—Connecting-Rod Stresses Complex—Four Valves Per Cylinder—Rotary Motors

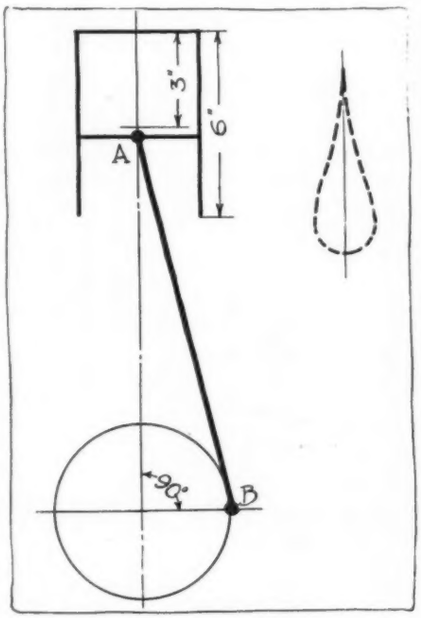
By Charles Vivier

ARCADIA, CAL.—Editor THE AUTOMOBILE:—The phenomenal crankshaft speeds attained by the modern racing motor have convincingly demonstrated the importance of the rôle played by the reciprocating parts. In the ordinary four-cycle motor, these parts are: the pistons, the connecting-rods and the valve mechanism. As the inertia forces and stresses increase rapidly in function of the speed and the weight of the moving parts, the problem is therefore to reduce their weight to the smallest possible minimum, taking into consideration of course the safe limits of the tensile strength of the parts subjected to the hardest work. This solution is no easy one, it being a fact that the motor invariably fails first under fast work. Yet great progress has been accomplished in the last few years in motor manufacture, thanks to the valuable help of modern metallurgy and the careful designing and machining of the delicate parts.

Regarding the pistons, remarkable strides have been made. Their weight is now considerably reduced in comparison to the cast iron product. Nickel alloy steels, with low co-efficient of expansion, are sharing honors with the aluminum pistons, which won both San Francisco races in Resta's Peugeot.

The aluminum piston has one great advantage over the steel piston: it radiates its imparted heat readily. If properly designed, the aluminum pistons will remain relatively cool under heavy work, thus eliminating the trouble of pre-ignition due to red-hot pistons, a danger ever-lurking around a high-compression motor. A well-known western firm specializing in aluminum pistons claims that its pistons will not melt zinc after a motor has been allowed to reach its greatest heat; if the same motor is run under identical conditions with steel pistons, the zinc will be promptly melted. Every racing driver knows that high compression is a valuable desideratum for power, but pre-ignition mercilessly dictates its limitations. In the Lyons Grand Prix, which was run on a warm day, much trouble was experienced from super-compressioned motors. The winning Mercedes had a geometrical compression not exceeding 6 kilograms per square centimeter, or 85 pounds per square inch.

With regard to the connecting-rod, no part of a motor is subjected to a more complex combination of forces and stresses. Referring to the illustration, the line AB represents the connecting-rod. Points A and B, the centers of the wristpin and the crankpin respectively, can be considered integral with the rod. Laying aside all explosion, compression, etc., stresses, point A is subjected to a reciprocal rectilinear, non-uniform accelerating and decelerating action, while B is subjected only to an uniform centrifugal action. Everybody knows that, owing to the angularity of the connecting-rod, the piston travels faster on the upper end of its course than on the lower one. This peculiarity is in favor of the efficiency of the motor because the piston can offer a more rapid expansion to the gases on the upper part of the explosion stroke. On the line AB, in one revolution of the crankshaft, every point of the connecting-rod below and near A, describes a figure like that at the right of the illustration resembling an elongated pear, which gradually shapes itself nearer a perfect circle in proportion as we get nearer to point B, which follows a circular path. In other words, on line AB, no two points describe the same course, identical either in shape or length, and yet, all motions between A and B are accomplished in the same length of time, the period necessary for one complete revolution of the crankshaft. In our case, if the stroke is 6 inches, the point A will travel 2 feet, at singularly variable speed, while B travels 3.1416 feet, at uniform speed, in the same length of time. One can easily imagine how, at racing speeds, the center of mass of the connecting-rod is somersaulting around its center of gravity.



Layout of connecting-rod

This state of affairs, which is inherent to the reciprocating parts mechanism, occasions tremendous strains, at high speeds, to the wristpin end of the connecting-rod, where fracture generally takes place. Most racing cars are put out of the running through the failure of one connecting-rod, and such accidents often play havoc with the motor.

Regarding the valve mechanism, great efforts have been made to reduce the weight of the reciprocating parts to a minimum, hence the idea of four valves per cylinder, and the overhead camshaft in combination with short valve stems. In a motor turning at 3,000 r.p.m., with the conventional valve lift, the energy necessary to lift the valves amounts to about 3 horsepower per pound of valve weight, which is no small item to be transmitted by the camshaft.

Rotary motors of the Gnome type offer a different aspect as regard the piston and the connecting-rods. In these motors, the cylinders revolve, the crankshaft being stationary. To one single crank is attached the main connecting-rod to which all other connecting-rods are articulated. Be-

sides, the explosion stresses, the piston and the rods are subjected only to the action of the centrifugal force. The pistons travel their stroke in the cylinders, because of the eccentric position of the crankpin in relation to the crankshaft. All intake and exhaust valves must be carefully counterbalanced with weights in order to overcome the effects of the centrifugal force. As these motors are intended for aeronautical work, they are made exceedingly light. Their massic efficiency is high, but their thermic efficiency is not. They are not suitable for automobile work; they are wasteful of oil and gas, and their large cubic inch displacement and enormous prices condemn them at the very start for terra firma work. The prices for the different Gnome models range from $2,600 for the 50 horsepower, seven-cylinder, weighing 135 pounds to $8,800 for the eighteen-cylinder, 200 horsepower weighing 550 pounds.—CHARLES VIVIER.

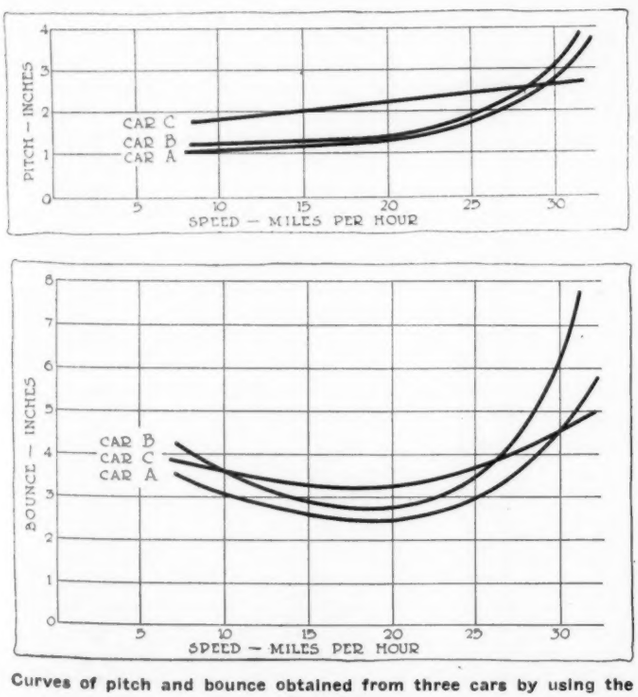
Simple Machine for Comparing Spring Action

By Hugh Pastoriza

EDITOR THE AUTOMOBILE:—The riding quality of an automobile is a somewhat indefinite thing, and is judged, by the average motorist, merely from the feel of the car as he rides in it. Obviously such a method of judgment cannot give close comparative results and the simple device described below was got up to afford a more exact method of comparison and one that any car owner can readily install in his machine.

The device as used is shown opposite. The fixed portion consists of a light pine board, 1 ft. wide by 2 ft. long, with a row of nails driven in it near each edge, and a plate of tin nailed to its center. From four of these nails, the moving element is suspended, by means of four ¼-in. rubber bands, stretched in as many directions. This moving element consists of an iron washer weighing about 1 lb., into the center of which a pencil is wedged. Obviously, any jolt will cause the pencil to move relative to the board and to make a mark on the piece of paper which is thumb-tacked over the tin plate in the center of the board. The arrangement is, it will be noted, extremely simple, and may be made up with almost no expense or trouble.

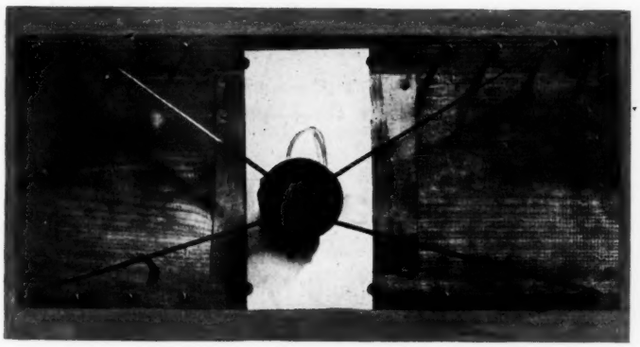
As ordinarily used, it is held in a vertical plane with its length parallel to the length of the car. To get a record of spring performance only, it may be set on the floor of the car, but as the effect of cushions ought ordinarily to be included, it should rather be held firmly upon the lap of someone riding in the car, so as to move with him. If, now, the car be run at a given speed, over a given stretch of rough road, or better still, over a standard "bump" (as, for example, a 2 by 4, with corners rounded, set out on a smooth road), then the moving element will draw a series of oval curves on the paper, differing for each car or other change in conditions. To get best results, the tension of the rubber bands should be adjusted, by moving from one nail to another, so that the largest curve drawn during the tests will not be over 3 in. high.



Curves of pitch and bounce obtained from three cars by using the apparatus

Reading the Results

The interpretation of these results is simple. Evidently the greater the horizontal width of the ovals, the more violent is the back and forward motion, or pitch of the car; and the greater their vertical height, the more violent the up and down motion, or bounce. For an ordinary road run, the average of the three largest throws in each direction should be taken for comparison, rather than the absolute maximum. The car giving the smallest ovals when run at a given speed over a given road, will, of course, be the easiest riding.



The complete apparatus for measuring spring quality

If the side movement, or roll of the automobile, is to be studied, the device may be held crosswise of the car and the horizontal width of the oval drawn will then correspond to roll instead of to pitch. Ordinarily, however, this movement is slight and of minor interest.

Records for several cars at different speeds have been measured up and the results plotted showing that:

Bounce is generally more than twice as violent as pitch.

Bounce is large at low speeds, falls at medium speeds and rises very rapidly above 30 m.p.h.

Pitch is nearly constant at low and medium speeds but rises at high speeds.

Actual magnitude and the effect of speed varies with the car, as might be expected.

The ease of riding of a car is dependent on a number of conditions: the springs; the shock absorbers; the frame; the cushions; the weight of the car; the number of passengers carried; the roughness of the road; the skill of the driver; the speed of driving.

In the ordinary case, as above described, the last four conditions would be kept constant and the results would show the comparative efficacy of mechanical design on the different cars tested. It is evident, however, that the effect of any one of the above factors alone may be studied by keeping the others constant. The effect of speed is thus found, as shown plotted. In a similar way, the relative value of different types of shock absorbers may be studied or a proper adjustment arrived at on a given type. Finally, the skill of drivers, or the roughness of roads can be tested in the same fashion. In short, with this device, one may study exactly a number of effects that he was only able to note roughly before and may find out a number of new things about his car.

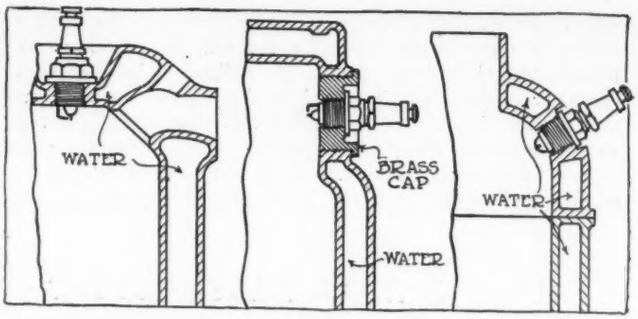
Spark Plug Should Be Vertical

Racing Experience Shows That This Is Best Position—Advocates Open End Type

By Gregory Flynn
Rajah Auto Supply Co.

EDITOR THE AUTOMOBILE:—With reference to the proper mounting of spark plugs in racing motors, our observations along this line tend to prove that placing the plug vertically through the water jacket accomplishes the best results. Although all modern racing motors are not so constructed that the plug can be placed vertically, all the designers of late have located the plug through the water-jacket, whether placed vertically or horizontally, and such mounting is essential in these days of prolonged running at maximum engine speed.

The one exception of modern practice is found in the Duesenberg motor where the plugs are placed horizontally through brass valve caps. This mounting has caused some plug trouble but not nearly as much as might be expected considering the consistent performance of Duesenberg racing cars. However, the new sixteen-valve Duesenberg motor has plugs placed vertically through the water-jacket.



Three possible positions for spark plug mounting. Left—Vertically through the water-jacket, the best position from the plug maker's viewpoint. Center—Horizontally through brass valve caps, least desirable of the three from the same viewpoint. Right—At an angle through the water-jacket, a position which has proved satisfactory

Experience shows us that our standard open-end plug has proved most satisfactory in the Peugeot, Delage and Mulford Special, having plugs mounted vertically through the water-jacket, whereas in the Maxwell racing cars where plugs are water-jacketed but placed horizontally, Mr. Harroun has found that our closed-end plug does not become fouled while in some cases the open-end type would.

As we have always advocated an open-end single-point plug we arrive at the natural conclusion that the vertical water-jacketed mounting of plugs will produce the best results.

Materials Increase 5% to 700% in Price

Small Increase in Iron and Cheap Steel—More in Good Steel and Other Metals

WITH reference to the cost of materials used in autobile construction, it has been threatened by some of the parts manufacturers that their prices for completed assemblies will rise next year, unless there is a drop in the cost of raw material.

Of course, it is not possible to estimate what an automobile maker pays for raw material simply by noting the quotations, because so much depends upon local conditions and so forth, but the market averages for the present time, and for a year ago show a general rise which translated into percentages gives a fair indication of how much more per cent the automobile trade will have to pay for materials as standing contracts are used up and new ones have to be made.

Iron Little Dearer

Ordinary iron and steel are not much more costly. Casting iron, such as is used for cylinders, is about 7 per cent dearer, and sheet steel in some sizes 5 per cent to 10 per cent dearer. Better steel such as is used for crankshafts and the more vital parts, appears to have increased much more, even to 20 per cent. Of course 20 per cent on the steel in an automobile motor does not represent much money per unit product, but 20 per cent on the total of steel bought by such a concern as the Continental Motor Co. for example, must be a staggeringly big sum.

It is when we come to the non-ferrous metals that the big differences show up in raw material costs, aluminum 250 per cent up, zinc 700 per cent up, copper 50 per cent up. Seeing that these are metals of which the market prices are sufficiently high to be quoted in pounds instead of tons, the increase on aluminum and brass is enough to make itself felt on the price of the unit article, and more than enough to make all the difference between profit and loss to a parts manufacturer bound to his present prices for selling.

A side effect upon the cost of all machine shop products is the immense increase in the cost of high speed steel, upon which all modern tools depend to provide the cutting edges. Owing to a shortage of tungsten, which is mainly an imported material, the high-speed steel price has risen rapidly from 50 cents to $1.25 per lb., and it shows every indication of going much higher. Of course this again, is not a big item in the cost of a car, but it represents so many more thousands of dollars per annum which *somebody* has got to pay.

Price Cuts Unlikely Next Year

What may be the effect on the cost of the complete car to the consumer? It is a question that cannot be answered, but if markets hold their present tone for another three months it will probably mean that 1916 will see the new 1917 models put out without much further price reduction. Improving methods of manufacture were undoubtedly the main reason for the big cuts made this year, and next season still greater economies are to be anticipated. With materials rising, however, the amount saved by manufacturing method will very likely have to go to offset the cost of the metal.

Data on Mixed Motor Fuels of Interest for American Export Trade

¶ Nothing in the following records of results obtained in Germany by using mixtures of benzol and alcohol as motor fuel is of immediate practical interest for motor car users in the United States. But they are important for manufacturers, who figure on export trade and must build for foreign fuel conditions or tropical climates. They also deserve to be placed on file for ready reference by all who are interested in having an active competition with gasoline established in this country sooner or later, so as to hold prices in check and satisfy the ever-increasing demand for motor fuels without courting too-early exhaustion of the petroleum supply. That this demand will increase at a phenomenal rate after the war is everywhere taken for granted, considering the necessity for motors to serve in the energetic production of wealth after a gigantic campaign of waste and destruction. The United States can produce benzol from coal in any desired quantity as soon as it is wanted and also an unlimited supply of alcohol at low cost if legislative restrictions are eventually removed. The utility of the records therefore applies to possible developments in the American fuel market as well as to actual constructive requirements in motors for export. Earlier tests relating to the use of other fuels than gasoline have forfeited most of their importance through the fact that the motors and carbureters employed were specially designed or that it was necessary at least to adjust the carbureter differently for each kind of fuel. Von Loew's much more practical object is to determine the results obtainable with a motor of an accepted automobile type which by a few minor modifications is enabled to work with a variety of fuels without special adjustment for any of them.

Before this was done no industrial results could be expected, since the designing and making of motors for any special fuel had to await the practical marketing of the fuel and no effort for organizing such marketing could be expected before the motors for it were created. Von Loew's work seems a happy contribution toward the solving of this deadlock which has long obstructed progress.

The first part of his report was rendered in substance in THE AUTOMOBILE *of August 12, pages 288 to 291 and 298 and includes a descriptive mention of the (90 mm. bore, 140 mm. stroke) motors used for the tests and the arrangements made for starting with a volatile fuel and heating the heavier fuels when necessary, as well as descriptions of carbureters which can be used.*—M. C. K.

Driving Tests with Benzol and Benzol-Alcohol Mixtures by Baron Von Loew

CONTINUING the tests previously reported, I selected mainly warm days during the spring of this year for experimenting with mixtures containing large proportions of alcohol. At the tests in the fall of 1914 it had been shown that a mixture of 1 part benzol with only 3 parts alcohol caused certain troubles when the fan behind the radiator was kept going (and subsequently the same results appeared during the cold days of last July). A sudden load would stop the motor, and it was therefore always necessary to open the throttle slowly. In other words, the motor had to be warmed up before it was safe to tackle a hill. In order to keep the motor at a higher temperature I disconnected the fan from October to April, and with this provision the motor worked again normally with the 1 to 3 mixture. Through the winter I used, nevertheless, the 1 to 2 mixture which gave excellent results. In April the fan was again connected. The 1 to 3 mixture worked then, with the fan running, equally as well as it had worked in the fall with the fan stationary. Mixtures of 1 to 4 and 1 to 5 were now also tried, and finally the car was driven on alcohol without any benzol. For all these trials the carbureter was still adjusted as for gasoline, as the principal object was to determine what fuels and mixtures will produce an efficient and economical operation of the motor without any re-adjustment of the carbureter. In the trials with unmixed alcohol the motor worked however so poorly and used so much fuel that no account in figures was kept, a change in the carbureter being evidently desirable. The figures obtained with the mixed fuels are best explained with reference to the appended tables.

Over table 1 there is drawn the profile of a road used for the tests specified in tables 1 and 4. The car was always driven at point *A* with a speed of 40 kilometers per hour and thereafter with its maximum of power. The highest tachometer reading was taken at the point *B* and the lowest at *C*, and the actually observed figures are those entered in the tables under *B* and *C* respectively. That the 1 to 2 mixture and the 1 to 3 mixture in table 1 seem of equal value may be due to some accidental factor, such as a variation in the wind resistance. All the values in tables 1, 2 and 3 were noted on the afternoon of April 30, 1915, when the temperature averaged 17 deg. C., and have not been improved by comparison with figures obtained at numerous other trials. All the figures in tables 4 and 5 are likewise those noted at trials on Nov. 1, 1914, when the temperature averaged 4 deg. C. The fan was in operation, however, on April 30, but not on Nov. 1.

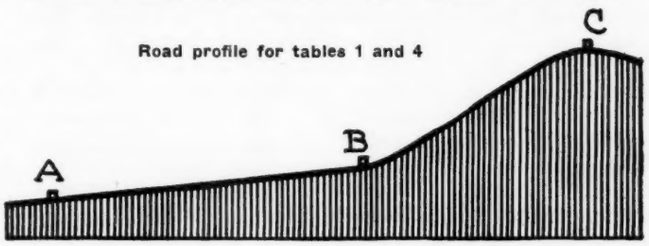


Table 1

SPEED RESULTS WITH SUMMER TEMPERATURE 17 DEG. C.

Benzol	*Alcohol*	*at B*	*at C*
Pure	none	67 km./hour	65 km./hour
1 part	+ 1 part	66 "	64 "
"	+ 2 parts	65 "	61 "
"	+ 3 "	65 "	61 "
"	+ 4 "	63 "	57 "
"	+ 5 "	60 "	56 "

Table 4

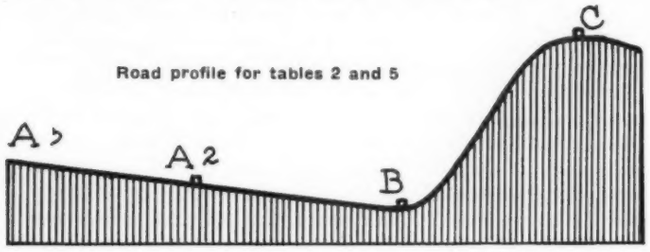
SPEED RESULTS WITH WINTER TEMPERATURE 4 DEG. C.

Benzol	*Alcohol*	*at B*	*at C*
Pure	none	65 km./hour	62 km./hour
1 part	+ 2 parts	62 "	56 "
"	+ 1 part	64 "	60 "

Tables 2 and 5 refer to tests on the stretch of road whose profile is shown over table 2, but the later tests (table 2) were started considerably nearer to *B* than those of last Fall (table 5) in order to save fuel which had become scarce. For the same reason the fuel consumption tests were conducted with only 1 liter of fuel for each, giving the figures in table 3, while the corresponding tests from Nov. 1, 1914, recorded in table 6, were made with 1½ liters for each, this being the full contents of the auxiliary fuel tank, and the original fig-

ures for table 6 have therefore been reduced one-third in order to have a direct comparison with table 3.

Table 2 shows plainly the marked drop in car speed at *C* which is characteristic of the mixtures rich in alcohol. With the 1 to 5 mixture it was at many other trials even necessary to change to the third gear speed shortly before reaching *C*, but the figures in the tables refer only to results obtained on the high gear. Table 2 illustrates how much better the car pulls with pure benzol than with the mixtures. A numerical comparison in this respect with gasoline could unfortunately not be established, for lack of this fuel, but it is well known that gasoline is considerably inferior in this particular.



Road profile for tables 2 and 5

Table 2

SPEED RESULTS WITH SUMMER TEMPERATURE 17 DEG. C.

Benzol		*Alcohol*	*at B*	*at C*
Pure	+	none	68 km./hour	50 km./hour
1 part	+	1 part	68 "	51 "
"	+	2 parts	68 "	46 "
"	+	3 "	63 "	42 "
"	+	4 "	62 "	39 "
"	+	5 "	58 "	34 "

Table 5

SPEED RESULTS WITH WINTER TEMPERATURE 4 DEG. C.

Benzol		*Alcohol*	*at B*	*at C*
Pure	+	none	82 km./hour	56 km./hour
1 part	+	2 parts	78 "	48 "

Table 3 shows much greater difference in the fuel consumption in the two opposite directions than table 6. The reason is that the morning of Nov. 1, 1914, was calm, while on April 30, 1915, a mild western wind favored the "going." And the road in that direction also has a very slight average down grade. The influence of the wind was not only plainly noticeable, but often proved a disturbing factor in the trials. With an eastern wind one could drive farther on a liter "returning" than "going," and on days when gusts of wind alternated with spells of calmness comparative figures could scarcely be established.

Table 3

DISTANCE RUN ON 1 LITER, SUMMER TEMPERATURE

Benzol		*Alcohol*	*Going*	*Return*
Pure	+	none	7.4 kilometers	7.1 kilometers
1 part	+	1 part	8.6 "	7.5 "
"	+	2 parts	8.0 "	7.2 "
"	+	3 "	7.8 "	7.0 "
"	+	4 "	7.7 "	6.6 "
"	+	5 "	7.2 "	6.0 "

Table 6

DISTANCE RUN ON 1 LITER, WINTER TEMPERATURE

Benzol		*Alcohol*	*Going*	*Return*
Pure	+	none	7.1 kilometers	6.9 kilometers
1 part	+	1 part	7.1 "	— "
"	+	2 parts	6.7 "	6.9 "

Two reasons can be assigned for the peculiarity in table 3 that the alcohol mixtures show a more favorable consumption than pure benzol. (1) The runs were made, one immediately after another, without any re-adjustment whatever—not even of a hot-air valve—and therefore the temperature of the carbureter on the unusually warm spring day was somewhat too high for benzol and more favorable for the alcohol mixtures. (2) All the runs for tables 3 and 6 were made at 40 kilometers per hour, and at this relatively low speed the carbureter furnishes a gas which is rather too rich in benzol. This conclusion is confirmed by the results recorded in tables 7, 8 and 9, referring to trials made on Nov. 5, 1914, and in June, 1915.

The intake manifold on my principal test car is provided with two air cocks, as at *HH* in the accompanying diagram, reproduced from my first report [see THE AUTOMOBILE, Aug. 12, page 289]. On the afternoon of Nov. 5, 1914, four trial runs were made with this car at 20 kilometers per hour over a stretch of road which averages level. For two of the runs the air cocks were closed and for the other two they were opened. The results, as given in table 7, show a considerable fuel saving with the cocks open.

Table 7

DISTANCE RUN WITH 1 LITER BENZOL AT 20 KILOMETERS PER HOUR

	Going	*Return*
With air cocks closed....	6.4 kilometers	6.2 kilometers
With air cocks open....	7.9 "	7.5 "

Also on runs where the motor was operated under heavy load on a mixture of about two parts benzol and one part alcohol—such runs being made June 8, 9 and 17 of this year—was it shown that the open air cocks had a favorable influence when the carbureter float was weighted with a perforated disk of lead; but, on the other hand, an unfavorable influence was noticed when the float was not weighted. The builder of the car had sent me two leaden disks together with the auxiliary tank and other things, when I began experimenting with the alcohol mixtures, and one of these disks I had on the float, as a rule, from Sept. 26, 1914, to June 17, 1915. Since this date I have generally not made use of it. Before discussing further the necessity or superfluity of weighting the float, however, the results obtained with open and closed air cocks both with and without float weights, as recorded in Tables 8 and 9, should be explained.

Table 8—Hill Climbing

EACH RUN ON 1 LITER OF FUEL COMPOSED OF 2 PARTS BENZOL AND 1 PART ALCOHOL. ALL RUNS MADE ON THE SECOND GEAR SPEED AND WITH THE FLOAT WEIGHTED

Date.	*Distance and Location*	*Air Cocks*	*Car Speed*
June 8, 1915.....	From 3.9 to 6.8	Closed	20 km.-hr.
"	" " 6.7	"	" "
"	" " 6.92	Open	" "
June 9, 1915.....	" " 7.0	"	" "
"	" " 6.9	"	" "
"	" " 6.95	"	" "
"	" " 6.96	"	30 km.-hr.
June 17, 1915.....	" " 7.0	"	" "

These runs, as referred to in Tables 8 and 9, were made on the longest and steepest hill in the neighborhood of Wies-

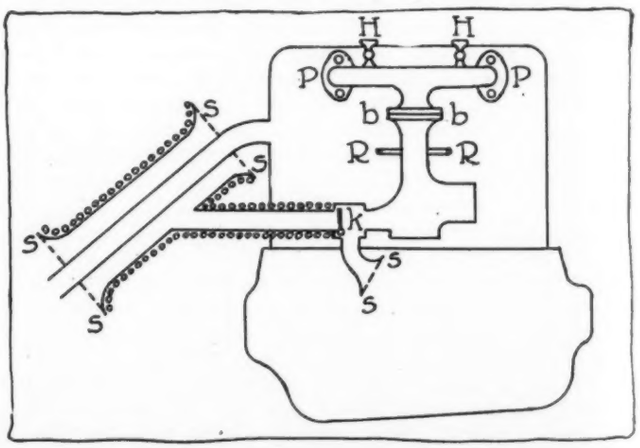


Diagram of arrangements for air cocks and preheating of fuels

baden, which is the road running to Hohe Wurzel, 619 meters above sea level, with an average grade of 1 in 10 from kilometer-stone 3.9 to 7.04. The distances in the tables are indicated by the kilometer-stones between which each run was made. On this road the car could generally work with full motor load. The tables show plainly that the effect of opening the air cocks is much less pronounced than under the conditions of Table 7, with the car running lightly on a level road at 20 kilometers per hour.

Table 9—Hill Climbing

EACH RUN ON ⅓ LITER OF FUEL (2 PARTS BENZOL AND 1 PART ALCOHOL). ALL RUNS ON THE SECOND GEAR SPEED AND AT 20 KM./HOUR

Date	*Distance and Location*	*Air Cocks*	*Float*
June 17, 1915.....	From 5.5 to 6.9	Closed	Weighted
"	" " 7.06	"	Not Weighted
"	" " 7.05	"	"
"	" " 7.04	Open	"
"	" " 7.04	"	"

The specific gravity of benzol is .88, of alcohol .82 and of gasoline .72. If one wants these fuels all to stand at the same level in the jet, a float intended for gasoline must carry a thick leaden disk when benzol is used and a thinner one when the fuel is to be alcohol. On the other hand, benzol requires more air for its combustion than gasoline does, and it is therefore better to have it stand lower in the jet. The two properties of benzol, namely (1) its higher specific gravity and (2) its greater need of air, have thus opposite effects, and in accordance herewith it is in my experience generally better not to weight the float.

With alcohol the situation is different; it requires less air for its combustion. Therefore the weighting of the float is more desirable with alcohol than with benzol, although its specific gravity is lower. The Pallas Carbureter Company says: "Our carbureters work without any change equally well with gasoline and with benzol." But it furnishes carbureters intended for alcohol fuel with a float weight which is soldered on.

After investigating the influence of air cocks and float weights on the steep road to Hohe Wurzel, I returned to comparative tests of different benzol-alcohol mixtures, and the results of these are shown in Table 10.

All runs of Table 10 began at kilometer-stone 5.5 and were made with full power. As seen from the first column of figures, the first three runs were made on July 3 with a mixture of 1 to 5, and the half-liter was used up at kilometer-stones 6.51, 6.49 and 6.49 respectively. On July 9 the same mixture reached in the first run only to roadstone 6.3, as the motor worked so poorly, owing to unusually cold weather, that a portion of the distance had to be covered on low gear. The figures of this table reveal a few small irregularities, as, for example, that on July 9 the 1 to 4 mixture worked less well than the 1 to 5 mixture. These irregularities are not due to any effect of wind resistance, as in the case of Tables 1, 2 and 3, but depend on whether the runs were made between 2 and 3 o'clock in strong sunshine on the steep hillside or under other conditions. At that hour the sun stood just in the direction of the main stretch of this very broad road, while at other times the road was shaded by the adjacent forests. Table 10 shows also a great difference in the two runs which were made on July 9 with a 1 to 2 mixture, one of these runs being made on second and the other on third gear. It has been ascertained by comparison with other subsequent trial runs that the difference in the present instance became so large only because the motor with a 1 to 2 mixture and on second gear reached an enormously high speed and could not be throttled on account of the purpose of working with full power.

The table further accounts for two runs with unmixed gasoline, which I have kept for extraordinary occasions since before the war, and a run with a mixture of benzol and kerosene has been added for comparison. I expect to report later on some additional trials with different benzol-kerosene-alcohol mixtures.

When average values are computed from Table 10, the figures listed in Table 11 are obtained. The showing for the mixtures which are rich in alcohol are here considerably less favorable than in Table 3. The reason lies in the shortcomings of these mixtures under heavy motor load—the same as noticed at point *C* in Table 2. This shortcoming can however be met with excellent results by narrowing the carbureter channel, as later trials have shown which will be included in my next report.

Table 10

HILL-CLIMBING TRIAL RUNS WITH ⅓ LITER OF FUEL AND HIGHEST SPEED. FIGURES REPRESENT KILOMETER-STONES REACHED, STARTING FROM STONE 5.5. HEAVY FIGURES INDICATE THAT SECOND GEAR — AND IN ONE CASE LOW GEAR — WAS USED

Fuel	*July* 3	*July* 6	*July* 9
1 benzol + 5 alcohol.....	**6.51**	....	**6.3**
	6.49	....	**6.5**
	6.49	....	**6.53**
1 benzol + 4 alcohol.....	....	**6.62**	**6.52**
	....	**6.57**	....
	....	**6.5**	....
1 benzol + 3 alcohol.....	6.75	6.72	**6.54**
	....	6.68	....
1 benzol + 2 alcohol.....	6.82	6.8	**6.59**
	6.83	....	6.83
1 benzol + 1 alcohol.....	6.84	6.83	6.86
	6.85	....	....
Pure benzol	6.89	6.87	6.9
	6.9	....	....
Pure gasoline	....	6.75	6.76
1 benzol + 2(?) kerosene.....	....	....	6.83

Table 11

AVERAGE VALUES IN METERS COMPUTED FROM TABLE 10

1 benzol + 5 alcohol.....	5.5 to 6.5	= 1000	meters
1 " + 4 "	" " 6.6	= 1100	"
1 " + 3 "	" " 6.7	= 1200	"
1 " + 2 "	" " 6.8	= 1300	"
1 " + 1 "	" " 6.85	= 1350	"
Benzol pure	" " 6.9	= 1400	"
Gasoline pure	" " 6.75	= 1250	"
Benzol-kerosene	" " 6.8	= 1300	"

[Von Loew here adds a table showing how far 1 mark's worth of each of the fuels and fuel mixtures will take a car at the present German fuel prices, which are 38 pfennig per liter for gasoline, 37.5 for benzol, 34 for denatured alcohol and the mixtures according to their proportions, but this table is here omitted as the prices during the war are artificial. As they are, the greatest mileage and therefore the greatest economy are credited to the equal mixture of benzol and alcohol, while unmixed alcohol is fully as economical as gasoline if the carbureter channel is narrowed, as above referred to.]

One defect attaches of course to all the figures in all the tables; namely, that they were all obtained with one car. I have, to be sure, also made trial runs with both my older cars, using benzol-alcohol mixtures up to the proportion of 1 to 2 with good success. But I have not taken note of numerical values with them, as little troubles easily arise with cars of the older types. When a spark plug misses fire even only for a few moments during a trial run, or a carbureter float sticks, the run is of course numerically without value. With the new cars these interruptions have so far not occurred; only once, on a trial run with solutions of naphthalene, some peculiar phenomena were observed which probably should be ascribed to crystalline precipitations of the naphthalene in the auxiliary jet.

[Translated from *Automobil-Rundschau*, September, 1915]

Stewart Adds Ford Starter

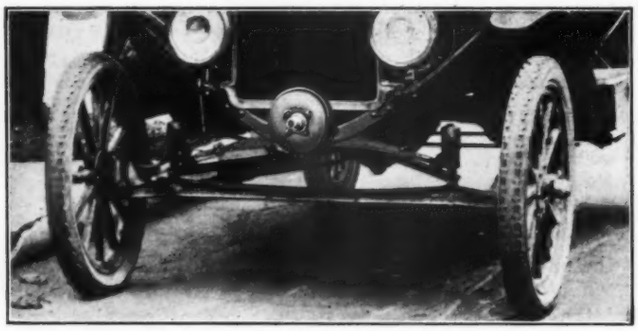
Is of Pneumatic Type, Combining Tire Pump—No Machine Work Necessary in Installation—Outfit $40

A PNEUMATIC starter designed specially for quick installation on the Ford car is the latest addition to the line of the Stewart-Warner Speedometer Corp., Chicago, Ill. The outfit consists of an air compressor, similar in design to the Stewart tire pump with modifications made necessary by the necessity of storing compressed air, an air motor having a rotating piston, a tank for the storage of the air under pressure, and lastly an automatic distributing or regulating valve and an automatic starting clutch. In addition to this the only two parts are the pedal push button with its linkages to the regulating valve and the sliding clutch, and a pressure gage on the dash, and the hose and pipe connection for the transfer of the air.

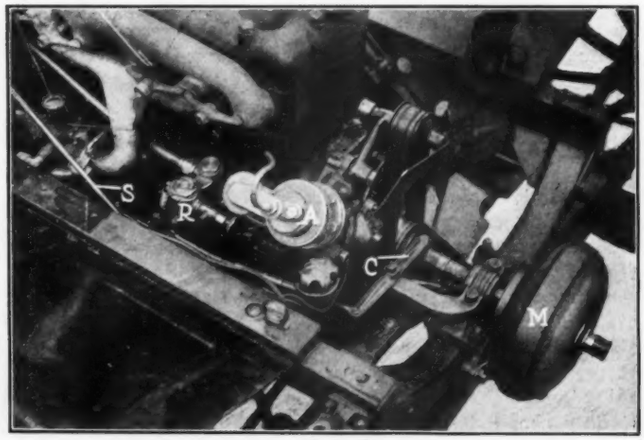
Stewart air motor with cover plate removed, showing rotating piston P and stationary vane V

No Machine Work Necessary

The outfit ready for installation, which requires no machine work and can be done by any owner in a few hours' time, sells for $40. The starting motor, or cranking unit, is an air-tight cylinder, circular in form and which replaces the old crank handle. Passing through this cylinder is a shaft which engages the motor shaft, the same as the crank-handle shaft formerly did. Within the cylinder is a stationary head or vane *V*, also a piston *P*, or bat-wing valve, which is attached to the shaft. This valve or piston is attached to a collar through which the starter shaft passes, and inside of the collar is a pawl which engages the groove or teeth in the starter shaft. A driving clutch *C* is attached to the end of the starting shaft, the driven member being installed on the end of the motor shaft.



How the Stewart pneumatic starter appears on a Ford car



Stewart air starter for Fords. S is control rod from floorboard, R regulating valve, A air compressor, C sliding clutch, and M air motor

In operation the driving clutch engages with the driven clutch at the same instant that a charge of air enters the starter cylinder. This air pressure causes the piston and shaft to make one complete revolution, but it spins the motor shaft up to as many as eight or ten revolutions.

In order to make a steady yet easy installation of the air pump, or compressor, it is an integral part of a timing gear case cover which is substituted for the cover already on the motor. The piston of the air pump is driven from an eccentric installed on the end of the timing gear shaft, and is running at half the engine speed whenever the motor is running. The air pump is designed to maintain pressure of 200 lb. in the air reservoir. When this pressure is reached a diaphragm valve in the pump closes the air intake and prevents pressure rising above 200 lb. When air is used for starting, or inflating tires, thus reducing the pressure in the reservoir, the pressure on the cut-out diaphragm is relieved and the intake valve opens, permitting the pump to force air into the reservoir until the 200-lb. limit again is reached. Thus the pressure in the tank is automatically maintained.

Tested for 600 Lb. Pressure

This tank, or air reservoir, is suspended underneath the body of the car and is carried in brackets which are attached to the frame. It is tested for 600 lb. per square inch pressure, so that the factor of safety is adequate.

The passage of air from the reservoir to the starter motor is controlled by the pedal through an outlet valve which is a part of the air control, or regulating valve. Pressing the pedal opens this outlet valve and permits a charge of compressed air to enter and operate the starter motor.

The outlet valve, which is operated by the pedal, also is connected with a lever which engages the driving clutch with the driven member, thus connecting the starter motor with the crankshaft of the car. There are two stages in the operation resulting from a pressure on the pedal. During the early part of the movement of the pedal the clutch is engaged in just the same way that the old hand starter crank is engaged with the shaft before the actual cranking is started. When the clutch is engaged further movement of the pedal opens the outlet valve, admitting compressed air from the tank to the starter motor, which spins the crankshaft.

For Winter Starting

For winter starting, the choker wire, normally connected with the carbureter and passing through the radiator, is replaced with a choker lever installed on the dash. Tire inflation is provided for by a valve and nipple on the air-controlled valve, and hose connection with tire pressure gage. The starter complete, with pump, tank, motor and connections, adds 42 lb. to the weight of the car.

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Wanted! Racing Cars

THE racing year which has just closed with the Sheepshead Bay contest for the Astor Cup has concluded a series of demonstrations that the speedway event can become a part of our national life; that it is a popular sport and as a business, well worth following. But if it is to continue to be successful and popular we need, in fact we *must have*, some more cars. Even this year, despite foreign importations, we have not had enough cars of the first rank, and there has been but one big event to each speedway.

We have seen good racing from four teams. the Peugeots, Stutz, Duesenberg and Maxwell. What have we had outside these capable of sustained speed at meeting after meeting? Now it would appear that the Peugeots are tiring, just as a racehorse will tire and go stale after a few big contests. De Palma's Mercedes is giving such trouble that he and it have disappointed the public who had paid their money partly to see this combination on more than one occasion. What have we got left as next year's prospect?

A car of the first rank of speed is fit for only two or three hard, long races, especially a car that is far from its parent factory. American built machines have the advantage over the invader that they have their factory permanently behind them, and it is a matter of days only to get new parts or to try new schemes of detail design. Europe can send us no more cars to race with, and those we have will slowly but surely get worse and worse. Look at the performance of the Delage cars on the speedways this year and contrast it with their form two years ago.

Whatever help our big-minded manufacturers are able to give to owners of foreign cars in the way of factory facilities, whatever resources they have in repair shops and depot stocks are as nothing beside the advantage of a factory of origin close at hand.

We want five or six teams of three or four cars each from the leading factories of America. If the makers do not care to race, then let them build cars for sale to the many private sportsmen who have hitherto bought foreign productions. There are plenty of buyers for the proper class of car, and the prices paid in the past for alien machines were big enough to tempt the American manufacturer to consider the affair as a business proposition.

Here we have a great and prosperous business in the speedways, which have given pleasure to hundreds of thousands of spectators, and we have a far greater and far more prosperous industry in the automobile manufacturing field. Surely the greatest automobile producing country in the world can profitably care for the building of a few dozen racing cars a year. The foolish old idea that a manufacturer stands to lose by racing ought to be fairly well exploded now. The most ignorant man knows that the racing car and the passenger machine are as far apart as the racehorse and the mule. If a manufacturer does well in racing it advertises his name and is an advantage, but a firm with an established name in the touring car field would never miss an order by reason of failing in a race or two.

Any first-class factory can build a fairly good racing car, so widely has the knowledge of the principles and practice been spread, and so many are the existing good machines for study. A car of good material and sound design may not be a world-beater, but it could not fail to make a good showing and to provide good racing anywhere. Mere *presence* in the racing field is a sign that the organization is alive and progressive. It shows that the engineering force behind the touring car of standard production are men of intellect and experience, and, moreover, the knowledge to be gained, that is of value in everyday work, is much more than anyone could guess without actual trial.

America, thanks to the efforts of just two or three firms, is in a position in the racing world which it is worth while holding for the sake of our trade abroad. It is up to our manufacturers to realize that there is no market for American automobiles where the speeds made in the last few races here will not have an effect in raising the reputation of "made in U. S. A."

Furthermore, automobile racing when it is safe and sane and well conducted, as it is on our great speedways, is a magnificent advertisement for the motor car and motor-car using. The races without doubt have a potent effect in selling automobiles of all grades. So from the wide outlook of the whole industry the speedways are worthy of a proper support, a support that manufacturers should be quick to give.

Couzens Resigns from Ford Co.

Organizer of Great Business Finds Ford's Peace Propaganda Unendurable

DETROIT, MICH., Oct. 12—James Couzens, vice-president, treasurer and general manager of the Ford Motor Co., and who has been generally recognized as the great force back of the business end of the organization, resigned to-day from all active connection with the Ford organization, the reason given being that he could not agree with the recent public utterances of Henry Ford on the national question of peace and unpreparedness. Mr. Couzens' resignation comes as a sequel to the division between Henry Ford and the Dodge Brothers, which resulted in the starting of the Dodge factory over a year ago. It has been understood that there have been differences between Couzens and Ford for several years, these differences dating to some time before the Ford announcement of his profit-sharing plans, and also before the break with the Dodge Brothers. It is claimed that the split, however, is a direct result of the use of the Ford Motor Co.'s publication, the *Ford Times*, for the expression of Mr. Ford's views on war and preparedness.

Mr. Couzens' connection with Henry Ford dates back to the early part of 1902 when he first met Ford and became interested in the building of a sample car. Couzens, Ford and another associate followed the development of this particular sample, or experimental car until the spring of 1903 when they set about to form the present Ford Motor Co., which was organized in June of that year, and Mr. Couzens became business manager and secretary.

Couzens the Organizer

In the Ford organization it has always been recognized that Henry Ford was the man who was responsible for the early cars of 1902, as well as practically all models and designs of the company since, but that James Couzens has been the organizing, business, and financial moving spirit of the concern. The extent to which Mr. Couzens has profited from the Ford organization is practically indicated last June when the directors of the company increased the capital stock from $2,000,000 to $100,000,000, and when it was announced that Mr. Couzens received 1¼ per cent. At that time when the $48,000,000 new stock was distributed among the eight stockholders as a dividend, Mr. Couzens share was $4,800,000.

In speaking of his separation with Mr. Ford, Mr. Couzens said:

"I disapprove of Mr. Ford's views on preparedness, which proved of such serious moment to me that I was compelled to rupture my business relations with him. The friendly relationships between us that have exisited for twenty-two years have been changed of late, our daily differences increasing."

Although no definite information can be gained yet as to the changes to be effected in the Ford organization due to the resignation of James Couzens, it is stated on good authority that no one man will step into the position left vacant. Undoubtedly Frank L. Klingensmith, present secretary of the company will receive promotion, although Henry Ford states that several men will be advanced in order that each can take a part of the work. Ford states that the reorganization will be entirely among the present officials, the policy being to develop the concern's own men rather than seek department heads from outside. Among the men who will undoubtedly share in the change is C. H. Wills, the present production manager, who has been materially responsible for the great developments of the company, and Sales Manager N. A. Hawkins.

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Hudson to Concentrate on Six-Cylinder Types

DETROIT, MICH., Oct. 11—Rumors that the Hudson Motor Car Co. intended to bring out a twelve-cylinder motor have been heard many times during the last few months. There was even talk about a Hudson eight. To set everybody at rest, the Hudson company has now made a definite announcement to the effect that it will confine all its energy to the Hudson six, believing this to be the best motor.

In its announcement the company says: "The refinement and development of the six-cylinder type of motor leads us to believe that it surpasses in simplicity, low cost of upkeep, performance and general adaptability any other type of motor so far developed for use in pleasure vehicles."

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Michelin Brings Out Non-Skid

NEW YORK CITY, Oct. 9—The Michelin Tire Co., Milltown, N. J., has brought out a non-skid tire with rubber elevations which is known as the Michelin Universal tread. This is the first time this concern has manufactured a rubber non-skid tire. It has the flat tread of the Michelin racing tire, and on the tread is a raised pattern consisting of the letter M in a continuous series; the interstices between the rows of letters form a suction against the road and tend to hold the tire from slipping.

Sizes and prices of the new tire are:

32 x 4	$22.00	35 x 4½	$30.00
33 x 4	22.50	36 x 4½	30.75
34 x 4	23.00	37 x 4½	31.50
36 x 4	24.75	37 x 5	36.25

56 In. To Be Standard Tread

N. A. C. C. Directors Vote for Uniformity in This Respect, Beginning July 31, 1916

NEW YORK CITY, Oct. 7—At the meeting of the board of directors of the National Automobile Chamber of Commerce, Inc., held here it was decided to standardize the treads in motor vehicles at 56 in. after July 31, 1916. This will bring into line many vehicles which heretofore only varied from the given measurement by a fraction of an inch. A large majority of cars now in use has the 56-in. tread. The Chamber will hold its usual banquet during show week.

The traffic department's report indicated continued record shipments of motors cars. This has resulted in a shortage of freight cars, but the makers are co-operating with the railroad companies to avoid any serious delay in shipments.

Regarding the deliberations leading up to the adoption of the 56-in. tread, the committee on treads met in Detroit not long ago and prepared its recommendations. The trade had been broadly canvassed with the idea of securing the viewpoints of the manufacturers and the result was that it was decided to drop the practice of making 60-in. tread for the Southern trade. It was discovered that only in very few sections of the country were the roads in such a condition that the 56-in. tread offered any difficulty and the result was that they have all agreed to the 56-in. standard. One of the difficulties said to be in the way of the 60-in. tread is that the manufacturers concentrate their minds on the 56-in. standard with a result that orders for 60-in. tread are side-tracked until the factories are under less pressure.

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Collins and Hibbard Resign from R-C-H

DETROIT, MICH., Oct. 11—After having been connected with the re-organized R-C-H Corp. since February, 1914, A. H. Collins, vice-president and assistant general manager, and V. S. Hibbard, sales and advertising manager, have resigned. No successors have been named. Messrs. Collins and Hibbard will shortly announce their connection with a new concern now in course of organization.

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Hood Visits Detroiter Dealers

DETROIT, MICH., Oct. 11—Wallace C. Hood, general sales manager of the Detroiter Motor Car Co., is on an extensive trip through Illinois, Minnesota, Iowa, Wisconsin and Missouri, where he will visit Detroiter dealers and distributors.

August Exports Are $9,567,348

Over $2,000,000 Less Than in July—Cars Lower and Trucks Higher

	August, 1914 No.	Value		August, 1915 No.	Value
Cars	385	$441,879	Cars	3839	$3,121,834
Trucks	68	124,016	Trucks	1614	4,387,193
Parts	...	196,527	Parts	....	2,038,321
Total		.....$562,422	Total		....$9,567,348

WASHINGTON, D. C., Oct. 11—Exports of passenger cars and trucks together with parts, during August last amounted to $9,567,348, as compared with $562,422 for August, 1914, and with $12,302,345 in July last. Passenger car exports in August, 1915, were lower than the previous month, the August figures being 3839 cars valued at $3,121,834, compared with 2469 cars valued at $6,803,001 in July, 1915. During August, 1915, 385 cars valued at $441,879 were exported. Trucks numbering 1614 and valued at $4,387,193 were exported in August, as compared with 4118 valued at $3,835,347 in July last. Truck exports during August, 1914, numbered only sixty-six, valued at $124,016. Parts exports during last August, amounted to $2,038,321 as compared with $1,663,997 in July last and with $196,527 in August, 1914.

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Continental to Increase Capital

DETROIT, MICH., Oct. 12—A special meeting of the stockholders of the Continental Motor Mfg. Co. has been called for Oct. 19, the purpose being to propose an increase of the capital stock of the company in order to declare a stock dividend. While officers of the Continental company are not willing to make any statement as to this dividend, it is rumored that it will be of 100 per cent.

The present capitalization of the company is $1,500,000. Its fiscal year ends June 30. At the end of the 1914 fiscal year the company had a surplus of $754,227.51. Its assets and liabilities totaled $3,075,388.97. The paid par value of its stock is $100. During the last two weeks it has gained more than 40 points on the local stock exchange. The business of the company is said to be between 25 and 40 per cent larger at this time than it was at the same period in 1914.

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Perfection Spring Raises Capital

CLEVELAND, OHIO, Oct. 11—The Perfection Spring Co., this city, will increase its capital stock, now consisting of $500,000 7 per cent cumulative preferred and $1,000,000 common to $1,000,000 7 per cent cumulative preferred and $1,500,000 common. Of the new issue there will be issued at this time up to $250,000 preferred and $1,000,000 common, but no offering will be made to the public at this time.

Application has been made to the secretary of state at Columbus, for a charter for the Perfection Spring Co. of Cleveland with the above new capital. The company will take over the assets and business of the present company of that name.

The directors of the new company are: F. F. Prentiss, C. C. Bolton, T. E. Borton and Attorneys Horace Andrews and Benjamin Gage. This is a temporary organization. The permanent board will be elected later.

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Zimmerschied Talks Metallurgy Before Detroit S. A. E.

DETROIT, MICH., Oct. 12—Before 200 members of the Detroit section of the Society of Automobile Engineers and guests, K. W. Zimmerschied, chairman of the Standards Committee, gave a talk here to-night on the Influence of Metallurgy on Design. The question always has been, he said, whether a part should be large or of better material and smaller in section. There are limits to the development in reducing of size by the use of better materials and great progress has been made in the last five years regarding the cause of steel failures.

Zimmerschied touched upon the mechanism of failure and dealt with the theories of molecular and crystalline structure of steels. He advised the avoidance of sharp corners or abrupt changes in section of parts, as they localize stresses. He refers to sharp edges in keyways, splines, etc. Scratches and tool wounds also have this effect. Vibrational stresses are also to be guarded against.

A very interesting series of moving pictures illustrating the evolution of steel pipe from ore to finished product was shown by the National Tube Co.

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Naval Engineers to Attend Metropolitan Section Meeting

NEW YORK CITY, Oct. 13—Twenty naval engineers who are studying this year at Columbia University are expected to be in attendance at the meeting of the Metropolitan Section of the Society of Automobile Engineers, Oct. 21. The papers are of broad interest and should attract considerable attention. Prof. William Campbell of Columbia University, who is a widely recognized authority on metallurgy, will deliver a short address on the elements of metallography and this will be followed by a series of motion pictures showing the manufacture of steel tubing from ore to tube, with a lecture on the processes of manufacture.

France to Have 45% Duty

Plans to Secure Russian Market For Entente Powers, Excluding Neutrals

PARIS, Sept. 24—American automobiles entering France are to be met with a 45 per cent tariff. This information is given on the very highest authority. Negotiations are already well in hand between the united body of French automobile manufacturers and the Government which will lead to a complete revision of the tariff. Before England had decided on a 33 1/3 per cent import duty, and while this move was unknown in France, it had been decided in France to raise a protective tax. Either the American tariff wall as regards automobiles must be cut down to the French level, or the French wall will go up to the American height. As rapid action may be expected in this matter as shown by England. The French industry, which has the full support of the Government, is determined that American manufacturers shall not step in and grab its markets during the after-the-war interval when the demand will be strong and the home factories will be unable to meet it.

Makers' Union Excludes Germany

There is a more important phase of this protective campaign. The various automobile manufacturers' associations of Europe are united in an international union. Germany is a member of that union, but she will be struck off, and will remain off, when the war comes to a close. France, England, Belgium and Italy, will remain the leading members of that union. Russia will not be in, for she has no automobile industry; she will be considered, however, on the same footing as the active members. By means of the union, reciprocal preferential tariffs will be established among the Allied nations and prohibitive tariffs erected against neutral and the present enemy nations. This means that the Russian automobile market will be open to England, France, Italy, and Belgium, but will be protected against other countries by high tariffs. The Russian market is the most important, for it offers infinite opportunities of development. What applies to Russia is applicable to the other Allied nations. France, England, Italy and Russia do not fear one another's competition. France and England are fully aware that the war will find their automobile factories swept clean of both automobiles and automobile parts and faced with a transition period during which they must transform their works from war to peace requirements.

Indianapolis Race to Be 300 Miles

Next Speedway Contest on Hoosier Track May Be for $30,000 Instead of $50,000

INDIANAPOLIS, IND., Oct. 8—Carl Fisher, president of the Indianapolis Motor Speedway has announced, this week, that the next Speedway race slated for the Indianapolis speedway would be 300 miles instead of 500, as has been the custom heretofore.

"I am convinced that the shorter race will be more popular with the race going public, for experience has taught us that 500 miles is a little too long to be enjoyed fully by the spectators," said Mr. Fisher.

Mr. Fisher said that he believed all contests next year would be 300 miles and that purses would be reduced accordingly to $30,000 instead of $50,000. When asked if the race May 30 would be for $30,000 instead of $50,000, Mr. Fisher said that he would be in a position later to make a statement on this angle of the race. He left the impression, however, with his auditors that the purse would be $30,000.

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Predicts Lower Gasoline Prices

PHILADELPHIA, PA., Oct. 11—Speaking before the Franklin Institute of this city Dr. Benjamin T. Brooks, in charge of petroleum research in the Mellon Institute of Industrial Research at Pittsburgh, predicted that the price of gasoline would in the future be lower by reason of the methods which are being found for its extraction from the heavy crude oils. In his subject, The Decomposition of Petroleum Hydrocarbons by Heat and Its Application to the Motor Fuel Problem, Dr. Brooks pointed out that the automobile industry had increased out of proportion to the gasoline supply of the country. He had among his hearers chemists, engineers, oil and gasoline experts, and automobile owners.

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German Control of Benzol Ends

NEW YORK CITY, Oct. 9—The prediction was made last night at the first fall meeting of the local section of the American Chemical Society at the Chemists' Club, 50 East Forty-first Street, that at the end of the European war benzol would find extensive use as a substitute for gasoline as the motive power for automobiles. It was pointed out that whereas before the European war this country was producing only 3,000,000 gal. of benzol, the large steel works, many of which did not recover their benzol, are now producing about 15,000,000 gal.

It was also predicted that the German domination in this product, existing before the war, will probably be a thing of the past.

I. F. Stone, president of the National Aniline & Chemical Co., and speaker of the evening, stated that benzol could be produced now and sold at the same price as gasoline if it were necessary to do so. It is being largely used in Europe in place of gasoline, and the only reason it has not been used here has been the limited production and the high price, it normailly being about double the cost of gasoline.

Careful experiments for automobile purposes show that benzol has a motive power about 25 per cent greater than gasoline.

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To Build More Gasoline Plants in Texas

DALLAS, TEX., Oct. 8—Several plants for the manufacture of gasoline from natural gas will be built in Texas within the next few months, according to the statement of James Howard, the representative of one of the companies that is preparing to engage in the industry. It is stated that there are now about fifty plants in Oklahoma that manufacture gasoline from what is known as casinghead gas, or that gas which comes direct from the well with crude oil. The total output of these Oklahoma plants is about 80,000 gal. of gasoline daily. They are located at Tulsa, Bartlesville and other points and are being constantly increased in number. The gas which is now utilized for the manufacture of gasoline was formerly a waste product. In California there are said to be about twenty plants of this kind and they have a total daily capacity of about 35,000 gal. Some gas runs higher in gasoline than others. It takes about 500 cu. ft. of gas to yield 1 gal. of gasoline.

The grade of gasoline that is obtained from natural gas is more volatile than that which is obtained from crude oil. It grades all the way from 75 to 90 deg. gravity, and it is then reduced to a gravity of about 60 deg. by treating it with naphtha.

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Independent Gasoline Companies Meet in Chicago

CHICAGO, ILL., Oct. 9—Western independent oil jobbers are meeting here to appropriate funds for prosecution of independent refiners who, they say, are in subterranean agreement with the Standard Oil Co. to hold up gasoline prices.

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Twin City Gasoline Higher

MINNEAPOLIS, MINN., Oct. 9—The price of gasoline in the Twin Cities has advanced to 12½ cents, following a recent advance of 1 cent to 11½ cents per gallon.

100-Mile Race for Sheepshead

Tentative Plans Outlined for Special Race of Leading Drivers—$12,000 Prizes

NEW YORK CITY, Oct. 12—Tentative plans have been outlined for a special race on the Sheepshead Bay Speedway here Election Day, Nov. 2, at which probably six of the leading winning drivers of the year will compete. It is purposed to have $12,000 in prizes. $1,000 will be given as a guarantee of expenses to each of the six cars entering. The $6,000 remaining will be divided between two races, one of 50 miles with $2,000 in prizes and the second race of 100 miles with $4,000 in prizes. Harry Stutz has announced that none of his cars will be in the contest although there is a possibility that Cooper or Anderson may drive other makes. The drivers assured are Resta, Rickenbacher, Aitken, Oldfield, Burman, and perhaps Anderson or Mulford. It seems probable, however, that few if any of the winning cars will be available.

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New York Gasoline Up to 23 Cents a Gallon

NEW YORK CITY, Oct. 11—The price of S. O. gasoline in this city has been raised to 23 cents a gallon retail. This is the third advance in the last three days. Refiners on Thursday sent out notice of an advance in the wholesale price to 17 cents per gallon, making the fourth advance in price in the past three months. Retailers were selling at 21 cents on Thursday. On Friday the price went up to 22 cents, and on Saturday still another cent. Other oils, excepting kerosene, were advanced in sympathy with gasoline.

The dealers ascribe the advance to the enormous demand made upon American refiners by the European war and the largely increased consumption at home. Most of the companies suffered severely by the recent storms in the South. The producing facilities of several of them have been so crippled that they were obliged to buy from competing companies at a sacrifice in order to meet the demands of their trade.

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Velie Adds Four-Passenger Coupé

MOLINE, ILL., Oct. 8—The Velie Motor Vehicle Co., this city, has added a new body to its line mounted on the model 22 six-cylinder chassis. It is a four-passenger coupé with the driver's seat mounted slightly ahead of the passengers' seat which has a capacity of two. The seat for the fourth seat is mounted on a stationary pedestal capable of being

revolved in any direction. This provides a large, roomy car and there are drop windows which can be opened in seasonable weather. The car sells for $1,750, trimmed in dark blue whipcord.

The Velie 22 chassis has a 3½ by 5 block power plant, 124-in. wheelbase, 34 by 4 front tires and 35 by 5½ rear, dry plate clutch, four-speed gearset and is fitted with Gray & Davis electric lighting and starting.

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Jones Motor Car Co. Formed with $500,000 Capital

WICHITA, KAN., Oct. 9—A charter incorporating and authorizing a capital stock of $500,000 for the Jones Motor Car Co., this city, to manufacture the Jones Six, has been granted. Of the entire capital stock, $200,000 is taken by J. J. Jones, founder of the company, which began less than a year ago to build cars in a local plant here. The Jones six sells for $995.

With the granting of a charter, a reorganization in the local company takes place. Mr. Jones turns over the plant which he owned privately to the new company. But two Wichita men are named as incorporators, they being Mr. Jones and J. W. O'Neill, former treasurer, Kansas Casualty & Surety Co.

W. A. King, for fourteen years connected with the Detroit plants, will take charge of the local shops as chief engineer and superintendent of production.

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New All-Year Car for Mitchell

NEW YORK CITY, Oct. 9—The Mitchell-Lewis Motor Co., Racine, Wis., has brought out a new demountable Sedan top selling for $165 and furnished on both the five- and seven-passenger models. The interior is lined with whipcord and a large electric light is concealed in the top of the car. The windshield is built-in with ventilating features. The side windows are removable.

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Lynch, Hollier Production Manager

JACKSON, MICH., Oct. 9—The Lewis Spring & Axle Co. has appointed Leight Lynch production manager. Mr. Lynch was formerly a member of the Studebaker Corp.'s organization and more recently general manager of the American Top Co., Jackson.

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Pfeffer Off for Coast

DETROIT, MICH., Oct. 12—Vice-president and assistant general manager C. A. Pfeffer, of the Chalmers Motor Co., is en route for the Pacific Coast, to call upon Chalmers dealers and distributors. He will make stops at Chicago, Los Angeles, San Francisco, Portland, Seattle, Salt Lake City, Denver, Kansas City and several other important distributing places.

Perrin Is Timken Axle Engineer

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Alden Continues as Vice-President—Baldwin Service Manager—Other Changes

DETROIT, MICH., Oct. 8—J. G. Perrin has joined the Timken-Detroit Axle Co.'s organization in the capacity of chief engineer. Mr. Perrin was the designer of the first Lozier automobile and remained as chief engineer of the old Lozier Motor Car Co. for nineteen years. Last March he became a consulting engineer for the Continental Motor Mfg. Co. He has specialized on axle and chassis construction and is a member of the standards committee of the Society of Automobile Engineers, and also of the Detroit section of that organization.

H. W. Alden, who was chief engineer and vice-president of the Timken company, remains as vice-president.

G. O. Baldwin has been appointed service manager of the company. He formerly held a similar position with the Cadillac Motor Car Co., also with the Studebaker Corp.

J. M. Ready, formerly assistant to Leslie Williams, manager of accounts of the Timken-Detroit Axle Co., Clark Avenue plant, has been changed to the Timken-Detroit Axle Co.'s Metal Products plant, on the East side of Detroit.

F. H. Maisonville has been appointed assistant to W. H. H. Hutton, Jr., director of purchasing. He was formerly assisting purchasing agent with the Packard Motor Car Co.

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Materials Only Handicap of Detroit Factories

DETROIT, MICH., Oct. 12—The factories here continue to turn out cars in as large quantities as they are capable of, due to a demand which seems insatiable. Here and there curtailment of output is noticeable but this is not chargeable to lack of orders, but solely to inability to get the parts and raw materials necessary.

Although in some quarters it has been predicted that there would be improvement in the materials market, no such betterment of conditions has yet made itself evident, and the situation is causing no end of worry all along the line. Concrete evidence of the scarcity of certain standard forms of raw stock is easy to find. At one carbureter factory where they were formerly making float counterweights out of brass stock already rolled into circular form, they have been obliged to turn the pieces out of solid square stock. This is just an instance of what the shortage has meant and does mean. In many instances the inability to get the kind of material required has forced the working out of new methods of manufacture of certain parts.

Those concerns which did not have contracts placed months ago for their present requirements are the worst sufferers. Where foresight and money have made it possible, the slowness of parts delivery is not felt as badly as in cases where a concern's output is small, and it was impossible for it to tie up large sums in parts which were not to be used for several months later.

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Chalmers Shipments Gain 302%

DETROIT, MICH., Oct. 9—Shipments of the Chalmers Motor Co. for the quarter ended Sept. 30 showed a gain of 302 per cent over the same period of 1914. The company sold 154 more cars in July, August and September this year than were sold in the first nine months of the fiscal period ended June 30 last.

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1-Ton and 2-Ton Superior Trucks to Be Built in Atlanta

ATLANTA, GA., Oct. 8—E. G. Willingham's Sons, this city, will build the Superior truck in this city, as announced in THE AUTOMOBILE for Oct. 7. G. E. Whiteside, formerly with the E. R. Thomas Motor Co., LaSalle Niagara Auto Co. and the American Locomotive Co., is chief engineer. One and 2-ton type trucks will be built.

The truck is equipped with three-point suspension, valve-in-head motor, with offset crankshaft, multiple disk, Raybestos faced clutch and a unit power plant driving to internal gear-driven rear axle.

The rear axle construction is a feature. The drive is in the rear and does driving duty alone, as the load is carried on a solid I-beam member.

The company expects to make deliveries on its 1-ton truck, costing $1,350, by Nov. 1. An express body will cost $50 additional.

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Plan Climb to Pike's Peak

DENVER, COL., Oct. 8—The Pike's Peak Highway Association is planning to hold a hill climb next year over the 17 miles of road from Cascade to the top of Pike's Peak. One feature of the program, which will cover several days of competition, according to present plans, will be a truck contest, a result of the climb to the peak by the Wilson truck at the time of the highway opening.

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Parish & Bingham Buy Land

CLEVELAND, OHIO, Oct. 11—The Parish & Bingham Co. contemplates increasing its plant at West 106th Street and Madison Avenue, N. W., by 10 acres. A 10-acre tract at West 106th Street and Madison Avenue has been bought. The plant of the company covers a ground space of 22 acres.

Australia with Record Crops To Be a Leading Automobile Buying Power

American Automobile Manufacturers Benefited by Stoppage of European Exports to that Country—Majority of Cars Use American Tires—N. S. W. Imports Lower

SYDNEY, AUSTRALIA, Aug. 20—Australia, as an automobile buying power, promises to be a leader. Trade conditions throughout the whole of that country are at present very good, considering the expense the country is now undergoing on account of the war.

In Victoria, South Australia and Western Australia, the farmers will enjoy one of the finest and most prosperous seasons. The visible wheat at the present time constitutes a record crop.

The rise in value of the pound sterling in that country, which is at present well over par, means that the farmers will be able to clear off all debts on their holdings and will be in the fortunate position of having plenty of money.

Much difficulty during the first six months of 1915 was experienced with freight, many houses having much stock lying for four and five months on the wharves, especially in San Francisco. The effect of this was to throw trade into a state of confusion. This was offset, however, on account of a number of houses being stocked with last year's models, through the effects of the war, and business kept on going in a fairly prosperous manner. The present outlook of freight conditions is not very promising.

The stoppage of European vehicles being sent to this country has especially benefited the American makers. American trucks are fast finding a market and the outlook for large sales is very promising.

There are one or two things the truck makers will have to watch closely, and one is that all vehicles will have to be right drive. The position of the gear levers in the center does not matter a great deal as far as trucks are concerned.

New Truck Agencies

A number of the truck makers are taking advantage of the present demand by establishing Australian agencies. The Jeffery Co. recently established agencies throughout the whole of the Commonwealth, and one of the largest catering firms in Australia is now using those trucks. The Kellys Motor Garage of Sydney has taken on the Federal and the Sanford. Larke, Hoskins & Co., Sydney, who have never handled American cars before, have taken on the Republic. Dalgety & Co., of Sydney, Melbourne and Perth, have added the Willys-Overland and the Anderson electric. Murray, Aunger & Co. of Adelaide, have also taken on the Willys-Overland. V. Lewis, Ltd., of Adelaide, has taken on the Signal truck. McIntosch & Sons, Ltd., Sydney, recently added the G. M. C. line of trucks.

The best agents in the Commonwealth are now representing the American trucks. There are a number of other agents, not doing quite the same bulk of business, still availble for agencies.

In the passenger car field, the Ford leads in prosperity with Overland and Buick next. The Studebaker car is also doing a good business. The Hupmobile is doing well with the firm of Evers Bros. in Brisbane, and also with Denys, Lascelles of Melbourne, and Phizackerleys of Sydney. Another newcomer on the market is the Pullman, which has been established throughout all the capitals in the hands of new agents.

50 Per Cent Tires American

More than 50 per cent of the cars are using American tires, as the importation of European tires is practically stopped. American tires are finding a large market. At the present time the Goodrich, Goodyear and U. S. tires are being handled in Australia.

N. S. W. Imports Drop

Imports during the first six months of 1915 into New South Wales, the leading automobile buying State in Australia, dropped 43 per cent under those of the same period in 1914. $927,550 in chassis, parts and bodies were imported into that State in the first half of 1915 as compared with $1,649,085 in the same period of 1914.

The United States led all the other countries with a total import on its chassis and bodies of $374,010 against $304,735 for the United Kingdom, its nearest competitor. The American im-

Tabulation of Car, Chassis and Parts Imports into Australia in the First Six Months of 1915 and 1914

FIRST SIX MONTHS, 1915

Chassis and Parts

Country Whence Imported	Value	Country of Origin	Value
United Kingdom	$297,675	United Kingdom	$252,670
Canada	171,020	Canada	89,845
New Zealand	9,820	Belgium	18,705
Fiji	3,610	France	28,190
Belgium	2,840	Germany	7,104
France	4,470	Italy	72,615
Germany	2,445	U. S. A.	289,555
Italy	64,855		
India	455		
New Caledonia	10		
U. S. A.	202,670		
Total	$759,870	Total	$759,870

Bodies

United Kingdom	$51,075	United Kingdom	$52,065
Canada	46,630	Commonwealth	330
New Zealand	2,145	Canada	23,095
Belgium	875	France	1,510
Fiji	105	Germany	1,280
Germany	500	Italy	4,945
Italy	4,945	U. S. A.	84,455
India	330		
U. S. A.	60,175		
Total	$167,680	Total	$167,680

FIRST SIX MONTHS, 1914

Chassis and Parts

Country Whence Imported	Value	Country of Origin	Value
United Kingdom	$528,150	United Kingdom	$445,555
Canada	284,990	Canada	182,675
New Zealand	24,310	New Zealand	50
Belgium	96,335	Belgium	32,320
Ceylon	1,020	France	10,415
France	13,935	Germany	147,645
Germany	86,800	Italy	85,530
Italy	73,840	U. S. A.	496,170
U. S. A.	363,670		
Total	$1,473,050	Total	$1,473,050

Bodies

United Kingdom	$89,375	United Kingdom	$89,140
Canada	71,565	Canada	41,630
New Zealand	5,045	New Zealand	245
Belgium	3,965	Belgium	550
Ceylon	140	France	3,090
France	120	Italy	7,880
Fiji	4,410	Germany	3,070
Germany	5,130	U. S. A.	125,450
Italy	6,695		
U. S. A.	89,590		
Total	$276,035	Total	$276,035

ports, however, fell off considerably from those of 1914, which amounted to $621,620, over 39 per cent higher.

It will be noted by the accompanying table that quite a few of the American cars were sent either through Canada or England, probably on account of the poor freight conditions at San Francisco, from which place they could be sent direct.

Sales conditions in New South Wales may be reflected in the latest registration figures. During the first half of 1915, there were 1415 new cars registered. Commercial vehicles numbered 109 and motorcycles 1371. The total number of cars in use on June 30, 1915, was 10,570. The commercial vehicles numbered 639, taxicabs 236, and motorcycles 6461.

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$7,054,897 in Imports to Canada During 1915 Fiscal Year

DETROIT, MICH., Oct. 9—During the fiscal year ending March 31, 1915, Canada imported automobiles and parts having a total value of $7,054,897. This is a drop of $4,124,857 from the 1914 record which showed imports to the value of $11,179,754. Canadian made automobiles and parts exported during the fiscal year show a total value of $2,954,453 or $853,266 less than in 1914 when the total was $3,807,719.

Of the total value of the imported cars and parts the United States is credited with $6,734,077 out of the total of $7,054,897 for the past fiscal year while during the 1914 fiscal year the total credited to the United States was $10,454,163 out of the total of $11,179,754.

The details as to the imports and exports are shown in the accompanying tables:

IMPORTS

AUTOMOBILES AND MOTOR VEHICLES

From United States.....	1915	$4,591,182
From United States.....	1914	6,528,086
From Great Britain.....	1915	252,898
From Great Britain.....	1914	621,979
Other countries.....	1915	44,624
Other countries.....	1914	63,310

AUTOMOBILE PARTS

From United States.....	1915	$2,142,895
From United States.....	1914	3,926,077
From Great Britain.....	1915	22,337
From Great Britain.....	1914	31,981
Other countries	1915	961
Other countries	1914	8,321

EXPORTS

AUTOMOBILES AND MOTOR VEHICLES

To the United States.....	1915	$97,013
To the United States.....	1914	138,978
To Great Britain.....	1915	76,050
To Great Britain.....	1914	320,407
To other countries.....	1915	2,472,761
To other countries.....	1914	3,112,477

AUTOMOBILE PARTS

To the United States.....	1915	$35,558
To the United States.....	1914	36,341
To Great Britain.....	1915	130,001
To Great Britain.....	1914	1,895
To other countries.....	1915	243,070
To other countries.....	1914	197,621

Blaze Dixie Highway Trail

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Many Cars in First Official Inspection Tour from Chicago to Florida

FRENCH LICK, IND., Oct. 11—*Special Telegram*—French Lick was the objective to-day, there being 120 miles of stone and gravel roads between Indianapolis and the Hoosier Spa. It was a corkscrew journey, the roads winding in and out among the hills, but the most delightful day of the tour so far.

The run to French Lick took the tourists through the most scenic section of Indiana, over rolling hills, past fertile fields picturesque with the weather-worn rail fences of our grandfathers.

The same enthusiasm over the Dixie Highway marked to-day's run as that of the two previous days. Groups of farmers gathered at the crossroads to watch the cars go by. Pupils of the district schools answered the screech of motor horns with yells of welcome. There were throngs of people in the village squares of the various towns to promise their support of the great project that is to make North and South better friends and neighbors.

Brass bands blared at Martinsville, Bedford, Orleans and Paoti, and many were welcome signs strung across the road. At Bloomington, the noon stop, the officials of the Dixie Highway Association were showered with flowers as the Miami bound cars passed down the Main Street, which for more than a mile, was lined on both sides by residents. The bugle and drum corps of Indiana University marched in front of the motorcade and played martial music.

Highway Officials Join Party

Before the start of the run, four more notables joined the party, Tom Taggart, feudal baron of the Indiana Democrocy and vice-president of the Dixie Highway Association; Carl G. Fisher; Charles Bookwalter, former Mayor of Indianapolis and speechmaker extraordinary, and Kin Hubbard, the Hoosier philosopher and cartoonist. The skill of the drivers was put to a test as well as the cooling and accelerating powers of the cars, for the grades on the trip were steep and gear shifting was imperative. The roads were fine, especially on the afternoon run from Bloomington, and very little work will be necessary on this link of the highway to put it in first class condition.

On the outskirts of Martinsville, a 2-mile stretch of brick road is partially completed and other improvements, including the elimination of several sinuous turns, will be made in the spring in that vicinity. Tuesday morning is to be a half day of rest and recuperation, a meeting the directors being scheduled at that time.

A ribbon of dust hung over the road that joins Chicago and Danville on Oct. 9, as the cars, participating in the first official inspection tour of the Dixie Highway, covered the first leg of the 1800-mile journey. The start was made from Chicago at 9 o'clock and the pilgrims reached Danville shortly before 6 o'clock.

Governor Edward F. Dunne of Illinois, was the guest of honor on the trip to Danville and, before the cars checked out of Chicago, dedicated the motor thoroughfare that is to link the Great Lakes to Florida. The dedication ceremonies were held in front of the Lorado Taft statue, at the south end of the Art Insitute.

The first 25 miles of the trip was over the Chicago boulevards and the improved roads that connect the Illinois Metropolis with Blue Island and Chicago Heights. The motorcade of more than 100 cars was given an ovation at both these points.

Good Dirt to Danville

After leaving Chicago Heights, fair dirt roads were encountered as far as Momence. Here the tourists ran into a whirlwind of dust through which they rode for 28 miles. When they reached Watseka, the noon control, they were so full of dust that they had no appetite for the luncheon tendered them by the Watseka Commercial Club. In fact, they relished the promises of the Watseka citizens that this stretch would be improved inside of another year, far more than the corn beef and cabbage that was set before them.

Watseka county, the seventh richest county in the United States, is planning to vote a $1,500,000 bond issue this spring and by this time next year, a ribbon of concrete will replace the sand and dust trail between Momence and Watseka. At least, this is the pledge that the residents of the county have made and they say that it will not be repudiated.

More dust, but better roads were encountered on the afternoon trip to Danville, a distance of 65 miles.

Dedicate New Road

Upon arriving at Danville, the Dixie Highway tourists participated in the dedication of a 3-mile stretch of brick road that has just been completed, and in the evening, a banquet was held at the Elk's Club where Governor Dunne and Joseph Cannon, former Speaker of the House of Representatives, were the principal speakers.

The following officials of the Dixie Highway Association were in the motorcade that left Chicago: Judge M. M. Allison of Chattanooga, president; M. E.

Temple and T. R. Preston of Chattanooga, directors; W. S. Gilbreath, field secretary; and V. D. L. Robinson, assistant secretary.

The cars that will make the entire trip, are Field Secretary Gilbreath's Franklin; the official Cole; President Allison's, Cadillac; W. M. Dilsaver's, Hudson; J. H. Friberg's, Hudson; the Standard Oil Co.'s Overland, and George Scarborough's, Chevrolet.

Crawfordsville Meets Pilgrims

Eleven miles outside of Crawfordsville, the noon stop on Oct. 10, more than 100 cars met the Dixie Highway pilgrims and escorted them into the city that boasts of being the birthplace of Lew Wallace, the author. Luncheon was served there, the members of the Crawfordsville Commercial Club and the Montgomery County Automobile Club being hosts.

Before entering Indianapolis, the tourists made a circuit of the Indianapolis motor speedway at the invitation of Carl G. Fisher, who will be a member of the inspection party when it leaves here for French Lick to-morrow morning.

A Change of Program

ELIZABETHTOWN, KY., Oct. 12—On the original schedule Louisville was the night stop of to-day's run, but at a meeting last night the directors decided to extend the tour to this place in order to reduce the mileage of Wednesday's trip to Nashville because of the poor roads that will be encountered. This revision necessitated an early getaway from French Lick. Good dirt roads were traveled all the way to-day with the exception of a 10-mile stretch late this afternoon, when the cars would have had trouble had the day been stormy instead of fair. On the morning run from French Lick to Louisville the grades were not as steep as those of yesterday although we were among the knobs of Indiana. The roads were of stone and gravel.

Michigan Joins Union

At a directors' meeting held at French Lick last night, Michigan was admitted into the union of eight States that have pledged themselves to make the Dixie Highway an improved road from Chicago to Miami. It is the intention of the Wolverines to build a loop around the State, extending north from South Bend through Niles and Kalamazoo to Mackinack and South via Detroit and Monroe to Toledo, Dayton and Cincinnati. P. T. Colgrove and Frank Hamilton were elected directors from Michigan. The directors also adopted the Dixie Highway marker, which is to be a blue bale of cotton on a white field with the words Dixie Highway, in red.

1,006,835 Ford Cars Built

Up to Oct. 1 the Combined Production of All Plants Reached That Total

DETROIT, MICH., Oct. 11—There are now a great many more than a mere million Ford cars in operation throughout the world. On the first day of October car No. 1,006,835 had been manufactured and sold. Thus the dream, as well as the hope, of Henry Ford, that some day a million Ford cars would be in the hands of the people has been realized.

It should be stated, however, that this colossal production and sales record is not the result of the activities of the main or parent Ford plant here in Detroit alone. That production record of 1,006,835 cars represents the combined output of the main plant, the twenty-five assembling plants throughout the United States, the Canadian Ford plant and the British or Manchester plant.

Just what the total output of the plant here was in the grand total is not given, but it is safe to assume that 750,000 or more Fords were built in Detroit.

The Canadian Ford plant made and sold 57,352 Ford cars from 1905 to the end of the fiscal year 1915, which was July 30.

The Manchester plant has an annual output capacity for 15,000 cars. It is not known how many have been made there, but it is said that more than 30,000 Ford cars are now in operation in England.

Rayfield Motor Co. Petitioned

CHRISMAN, ILL., Oct. 7—A petition for involuntary bankruptcy for the Rayfield Motor Co., Chrisman, which has been engaged in the manufacture of small automobiles of the runabout type, was filed in the United States District Court at Danville this week. A. E. Schuckter, secretary and treasurer, and who claims to be one of the principal creditors, filed the petition. Other creditors are C. R. Livingston and W. M. Newkirk, all of Chrisman. Due to the failure of the Bonner Wrench Co., with which the company had been closely affiliated, it has been in financial trouble for the past year.

Disco to Announce New Starter—Increases Capital $40,000

DETROIT, MICH., Oct. 11—The Disco Electric Starter Co., will increase the capital stock from $60,000 to $100,000, the extra $40,000 being subscribed by the present stockholders.

It is said that this is a preliminary for a still larger increase which will become necessary to enable the company to build larger factory accommodation and to install the special machinery necessary for large production.

At the present time the company has contracts which are said to amount to $1,000,000 and is running night and day. Mr. Hackett, general manager, expects to put on the market very shortly a new and improved type of double unit starter and generator. It will be cheap enough to be within the reach of the car manufacturer making a low-priced car and powerful enough for cars of the $5,000 class. The machine was electrically designed by Prof. Benjamin F. Bailey of the University of Michigan, the mechanical features being the work of F. M. Guy.

Delco 1915 Output Will Be 125,000 Systems

DAYTON, OHIO, Oct. 12—During the month of September, the Delco factory at Dayton, produced 14,515 complete systems of starting, lighting and ignition equipment, in addition to many separate ignition systems.

This was the largest month's business the company has ever produced, and brings the number since Jan. 1 up to nearly 100,000 systems. The factory is still behind its schedules, and will build upwards of 125,000 systems this year.

In the meantime, the work on the new building is progressing. It is a concrete, brick faced structure and five stories have been poured. The brick facing has already begun to appear, and will be completed within a very few weeks after the concrete part is done.

This new building will more than double the floorspace of the Delco plant. It is an entire block in length, 420 ft. to be exact, and 88 ft. in width.

Disco Starter on Denby Truck

DETROIT, MICH., Oct. 11—The Disco Electric Starter Co. has been awarded the contract for electrical equipment for use by the Denby Motor Truck Co.

$500 Fines in Crown Co. Case

LOUISVILLE, KY., Oct. 9—In the Federal Court here to-day, technical pleas of guilty to a charge of using the mails to defraud were entered by C. H. Lambert, A. B. Lambert and B. F. Lambert, and fines of $500 each were assessed by Judge Walter Evans. The cases against the Lamberts grew out of transactions in which they, as representatives of the Crown Motor Car Co. of New Albany, Ind., accepted orders for automobiles when they knew, according to the District Attorney, that there were no cars available for sale.

176,428 Cars Registered in Ohio

Nearly 50 Per Cent Increase Over 1914 Total—13,600 Chauffeurs Register

COLUMBUS, OHIO, Oct. 9—Up to Oct. 8 of this year the Ohio Automobile Department registered 176,428 automobiles, which is almost 50 per cent increase over the total registration last year, when 121,400 cars were registered. It is figured that the increase of 50 per cent will be reached before the end of the year as the total registration will probably surpass 181,250, which is the figure to show the 50 per cent increase.

Chauffeurs to the number of 13,600 have been licensed. This is only a small increase over last year, but the constitutionality of the chauffeurs' license law is attacked in a suit now pending in the Franklin County Court of Appeals and the department is not enforcing the law at present. An effort will be made to have the law amended in case the Ohio Legislature is called in special session during the winter.

222,025 Automobile Owners in New York State

ALBANY, N. Y., Oct. 9—Registrations of automobiles in this State up to Oct. 1 this year amounted to 222,025, compared with 164,438 in the same period a year ago. Total registrations for 1914 were but 170,171.

This registration compares with a population in this State, according to the June census, of 9,250,000, an average of an automobile for every forty-four persons in the State.

Receipts of the Automobile Bureau thus far this year have amounted to $1,824,315, all of which will be expended in maintaining and building the roads of the State.

Three-Wheeled Tractor, $945

LOS ANGELES, Oct. 11—The Union Tool Co., Torrance, Cal., is placing on the market a three-wheeled agricultural tractor which is to sell for $945. It is provided with a two-cylinder motor and weighs complete 4000 lb. The overall length is 13 ft. 1 in., the width 6 ft. 7 in., and the height 3 ft. 11 in. This is the first model and is marketed after three years of experiments.

Wisconsin Registrations Gain 25,008

MILWAUKEE, WIS., Oct. 8—Wisconsin's 1915 registration up to Oct. 2 showed a gain of 25,008 over the total registry of 1914, bearing out predictions made early this year that the Badger State would absorb no less than 25,000 new cars from Jan. 1 to Dec. 31, 1915. The total registry on Oct. 4 was 78,169, compared with 53,161 on Dec. 31, 1914. Not only is the prediction of a gain of 25,000 in Wisconsin registrations borne out, but prospects are for a total registration of not less than 80,000 by the end of the year. On Saturday, Oct. 2, for instance, the secretary of state issued 101 new licenses and the daily average is from seventy-five to eighty. The effect of the show given by the Milwaukee Automobile Dealers, Inc., at the annual State fair in Milwaukee, Sept. 13 to 17, seems to be evident in the rush of applications for licenses during the four weeks immediately following the fair, and present indications show no abatement of the demand.

Iowa Cars Average $800 to $900 in Value

DES MOINES, IA., Oct. 9—Figures from the state automobile department of Iowa show that Iowans are not dodging the income tax although the purchase of 50,000 automobiles by Iowans in one year while the income tax returns show more wealthy inhabitants in the District of Columbia than in Iowa leads a Washington, D. C., newspaper to believe otherwise.

The Iowa secretary of state estimates that only 10 or 12 per cent of the 150,000 automobiles in Iowa cost in excess of $2,000 each, that only 20 per cent cost $1,500 or over, that over 50 per cent are cars costing from $400 to $500 and that the average value of all cars in the state is between $800 and $900. This seems to refute the assumption of the Washington paper that the ability to own an automobile is evidence of a $4,000 income. The fact is that most of the car owners in Iowa are farmers and salaried men with incomes ranging from $1,500 to $3,000 a year. A census taken of the automobiles owned by persons connected with a Des Moines newspaper shows that ten out of sixteen cars owned are the property of workers in the mechanical departments—printers, pressmen, stereotypers, etc.—who make on the average about $1,200 a year as governed by the union scale. These facts free Iowans from any suspicion of income tax dodging, for it shows that most of Iowa's automobiles are owned by people of moderate means.

New Danger Signals at Long Island Grade Crossings

NEW YORK CITY, Oct. 11—As a further safeguard against the recklessness of automobile drivers at grade crossings the Long Island Railroad is adopting a new form of watchman's danger signal. It has the word "stop" painted in large white letters on an 18-in. red disk.

Standard Tractor Under $700

To Be One-Man Outfit of Good Size—Some Features of Construction

DETROIT, MICH., Oct. 11—The farm tractor to be made by the Standard-Detroit Tractor Co., is to sell at under $700, and to be a one-man outfit, but not too small in size, the officers of the company believing that economy of labor demands that even on the smallest sized farms a tractor should be used as large as one man can operate satisfactorily.

As reported briefly in last week's issue of THE AUTOMOBILE, prominent men in the automobile industry are connected with the new concern. The stockholders are principally officers of the Federal Motor Truck Co. It is the object of the company to build tractors in every way up to the present truck standard as to materials and workmanship.

G. S. Jacobs is the designer of the tractor. He was formerly connected with the Oakland Motor Car Co. and the Rapid Motor Vehicle Co., Pontiac, Mich., also the Rumeley Co., La Porte, Ind. The first experimental models were brought out in 1914 and tests have been going on with different models ever since in various parts of the country.

Although the final specifications have not all been decided upon, the constructional features of the tractor will be four-cylinder block motor of 30 to 35 hp.; two front wheels with 8 in. steel tires, two rear drive wheels each with 24 in. wide tires, a gearset fully inclosed and running on roller bearings and final drive by chain. The chassis will be of special design, but many standard automobile parts will be used.

The officers of the company are: M. L. Pulcher, president; Charles F. Mellish, vice-president; L. W. Goodenough, treasurer; F. G. Jacobs, secretary. G. S. Jacobs is manager. Edward P. Hammond, president of the Gemmer Mfg. Co.; Thomas E. Reeder, president of the Federal Motor Truck Co. together with the officers, form the board of directors.

In last week's issue of THE AUTOMOBILE it was erroneously stated that Edward P. Gemmer, was one of the incorporators.

2487 Tractors in Kansas

TOPEKA, KAN., Oct. 8—J. C. Mohler, secretary of the State Board of Agriculture, has completed a census showing 2487 tractors in the State on March 1. Barton county, the leading wheat producing county, has the largest number, 123. The larger number of tractors is in the corn belt. Thirty-seven counties in that district have 1209 tractors.

Chevrolet Changes Name

Current Earnings are at Rate of $2,500,000 Per Annum or 12½% on Stock

FLINT, MICH., Oct. 8—The Chevrolet Motor Co. has changed its name to that of Chevrolet Motor Co. of Michigan.

NEW YORK CITY, Oct. 9—The constituent company of the new Chevrolet Motor Co., it is stated, shows earnings in the twelve and one-half months ended Aug. 14 last of $965,000, which is equivalent to 4.8 per cent on the capital stock outstanding. Current earnings are at the rate of $2,500,000 per annum, or 12½ per cent on the capital stock of $20,000,000.

With the introduction of funds raised from the sale of capital stock the company's balance sheet, as of Aug. 14, 1915, will show as follows:

ASSETS	
Cash in banks and on hand	$5,346,111
Accounts and notes receivable less reserves	359,992
Inventories of finished cars, merchandise on hand and in transit, and work in process	1,475,394
Investments	748,500
Charges deferred to future operations and suspense items	69,438
Invested—real estate, buildings, fixtures, equipment, tools, patent rights, developments, good will, etc.	13,237,242
Total	$21,236,677
LIABILITIES	
Accounts payable and accrued liabilities	$1,141,677
Mortgage on Beekman Avenue plant at Tarrytown, N. Y.	95,000
Capital stock	20,000,000
	$21,236,679

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New Company to Continue Making Randall-Faichney Products

BOSTON, MASS., Oct. 9—The property of the Randall-Faichney Co., has been disposed of at auction, the sale taking place at the property, 76 Atherton Street, Jamaica Plain. The entire property was bought by the creditors' committee for $150,000. Under the plan of reorganization which will now be carried out a new company to be called the Randall-Faichney Co., Inc., with new cash capital and a conservative board of directors will at once be formed and take over the property.

The property consists of a building and 33,609 ft. of land.

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Rubber Shortage in Berlin

LONDON, ENG., Oct. 9—According to a report received in this city from a person who recently left Berlin, there is a great shortage of raw materials. Rubber has been smuggled in in the form of sausages. The scarcity is so great that no private individual in Berlin is allowed to use his automobile, except the doctors. Rubber floors have been taken up and every scrap in any shape or form has been used.

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Austria Confiscates All Tires

ZURICH, Oct. 9 (via London)—The Austrian Ministry of War is reported to have confiscated the entire supply of pneumatic and other rubber tires in Austria, including those of private ownership, new or old. The owners of the tires are required to deliver them up within twenty-four hours under penalty of a year's imprisonment.

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Three Market Changes

NEW YORK CITY, Oct. 12—Markets this week made but two gains and one loss. The trading was normal, but the buying was dull. The steel markets ranged very low with but a few sales taking place. The copper markets opened the week firm on a good inquiry from war material manufacturers, but a steady recession in standard copper at London caused prospective buyers to withdraw from that market. There are many stocks of copper afloat from all over the country. The total supplies on Sept. 30 were 23,628 tons against 29,519 tons in the same period last year, with total deliveries 28,759 tons, against 30,518 tons. Antimony is receiving fair support. Aluminum was very active during the week, with several increases in prices recorded. The demand continues in excess of the supplies and holders at the close asked 50 and 55 cents per pound in carload lots. There was not much new business in the local rubber market last week and buyers were inclned to allow matters to shape their course a little more definitely for a few days. Up-River fine quoted at 57½ cents. The oil and lubricant markets were a bit unsteady during the middle of the week but returned to normal. Pennsylvania crude oil advanced 5 cents in the middle of the week, but the following day closed at its normal price. There was also an advance in gasoline of 1 cent. It is expected that within a month the price will have advanced to 25 cents to consumers.

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Porto Rico Increases American Car Purchases

SAN JUAN, PORTO RICO, Sept. 23—The past year has shown a large increase in the number of automobiles purchased in the island, 548 cars having been imported during the twelve months ending with June 30, 1915. No foreign cars have been sold here in recent years. There are approximately 2000 cars in the island, most of them in constant use.

There is no demand here for high-priced cars. Automobile tires showed a falling off during the past year as compared with the previous fiscal year. Tire imports for 1915 were $251,426; for 1914, $296,201, and for 1913, $241,714.

The automobile here is used as the chief means of passenger transportation, both private and public, about the island. There are regular motor lines running from this city to all sections of the island. Mail to about half of the towns is delivered by automobile, and most of the established motor lines operate an express and parcel-delivery service.

Recently the jitney has made its appearance here in competition with an interurban railroad running 5 miles between the towns of Catano and Bayamon. The railroad has carried 500,000 passengers a year and the fare has been 10 cents until the arrival of the jitney. Then the railroad cut the fare to 5 cents, but the jitney continues to get many passengers at the old fare of 10 cents.

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Indiana Mutual Insurance Co. Formed

SOUTH BEND, IND., Oct. 9—The Indiana Mutual Automobile Insurance Co., with home offices in Laporte, Ind., has been organized. Articles of incorporation have been filed with the secretary of state and have been approved by the auditor of state. The company has been organized for the purpose of insuring against fire, but the policy will also provide an amount of $50 to be paid in case

Daily Market Reports for the Past Week

Material.	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.50	.49	.48	.50	.50	...	...
Antimony	.27½	.27½	.27½	.27½	.27½	...	...
Beams and Channels, 100 lb.	1.56	1.55	1.55	1.56	1.56	...	...
Bessemer Steel, ton	24.50	24.50	24.50	24.50	24.50	...	...
Copper, Elec., lb.	.18	.18	.18	.18	.18	...	...
Copper, Lake, lb.	.18¼	.18¼	.18¼	.18¼	.18¼	...	...
Cottonseed Oil, bbl.	7.33	7.19	7.15	7.57	7.73	...	+.20
Cyanide Potash, lb.	.23	.23	.23	.23	.23	...	...
Fish Oil, Menhaden, Brown	.42	.42	.42	.42	.42	...	...
Gasoline, Auto, bbl.	.16	.16	.16	.17	.17	...	+.01
Lard Oil, prime	.85	.85	.85	.85	.85	...	...
Lead, 100 lb.	4.52½	4.52½	4.52½	4.52½	4.52½	...	...
Linseed Oil	.58	.58	.58	.58	.58	...	...
Open-Hearth Steel, ton	25.00	25.00	25.00	25.00	25.00	...	...
Petroleum, bbl., Kans., crude	.80	.80	.80	.80	.80	...	...
Petroleum, bbl., Pa., crude	1.75	1.70	1.70	1.75	1.75	...	...
Rapeseed Oil, refined	.77	.77	.77	.77	.77	...	...
Rubber, Fine Up-River, Para	.57½	.57½	.57	.57	.57	...	...
Silk, raw, Ital.	4.05	...	...	...	...	...	...
Silk, raw, Japan	3.77½	...	...	...	...	...	...
Sulphuric Acid, 60 Baume	1.00	1.00	1.00	1.00	1.00	...	...
Tin, 100 lb.	32.75	33.00	31.87½	32.50	32.50	...	—.25
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	...	...

of theft. The officers of the corporation are: Frank J. Cook, LaCrosse, president; Dr. F. H. Henderson, vice-president; Fred C. Brewer, treasurer; Clay M. Donner, secretary. The last three named reside at El Paso, Ill.

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Insurance Assn. in South Dakota

PIERRE, S. D., Oct. 9—For the first time since the law was passed March 10 advantage has been taken of the possibility of forming an automobile insurance company. F. H. Johnson, F. H. Reed, G. C. Cottan, L. C. Nichols and A. B. Fairbank have incorporated the American Auto Indemnity Assn. of Sioux Falls.

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Bosch Magneto Wins Contracts

NEW YORK CITY, Oct. 8—The Bosch Magneto Co. has signed contracts as follows: Chandler Motor Car Co., Brewster & Co., Stewart Motor Corp., R. M. Owen & Co., W. Irving Twombly, Atterbury Motor Car Co., Blair Motor Truck Co. and Brockway Motor Truck Co.

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Berger New York Lozier Manager

DETROIT, MICH., Oct. 9—L. B. Berger, who was sales manager of the Lozier Motor Co., has been appointed manager of the New York branch.

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Stutz Has Running Board

NEW YORK CITY, Oct. 13—Owing to an engraver's mistake the advertisement of the Stutz Motor Car Co., which appeared in THE AUTOMOBILE for Sept. 30, included a photograph of the Stutz Bulldog Special which showed no running board. This was removed accidentally when trimming the cut.

Securities Markets Dull

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Sharp Declines in Many Issues—Losses Small—Trading Normal

NEW YORK CITY, Oct. 11—The securities markets remained dull throughout the whole of last week. There were very few changes. A few small losses occurred. Trading conditions were at a standstill and there were but a few bidders in sight. There were a few exceptional good closing prices. Firestone closed at 575, or 15 points higher than last week. This tire issue was the only one to make a high gain, the rest making either minor gains or losses. The specialties markets were a bit firmer, making many good gains and but few losses. The he viest gain took place on Satuday when at the closing Packard was quoted at 139, a gain of 13 points. Then followed closely to that Chalmers, with a gain of 11 points. General Motors also made a few points gain, when it closed at 341. The rest of the issues remained dull.

Detroit Quotations Active

The Detroit issues were a bit more active last week, there being no decline made during the whole week. Continental Motor featured the market there when on Saturday it closed at the high mark of 325, a total gain of 30 points. Chalmers closed at 157½, or 18 points gain. Packard's closing bid was 137, making the gain 11 points. These were the main gains, the rest of the issues in the active stocks closing a little above the average mark of last week's rating. The inactive stocks made no changes. The trading conditions in Detroit were very firm and many shares changed hands.

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To List Chalmers Common Stock on New York Curb

NEW YORK CITY, Oct. 9—The Chalmers Motor Co., Detroit, has applied to list 50,000 shares of common stock of par value $100 on the New York curb. Action will be taken at once to list it on the Philadelphia Stock Exchange.

The Chalmers company has outstanding $5,000,000 common stock, paying 10 per cent dividends, and $1,185,500 7 per cent cumulative preferred. The original issue of preferred was $1,500,000, and $313,500 has been retired.

The company is free of bonded debt. Its balance sheet shows that cash on hand alone considerably exceeds the company's current liabilities. It is stated that after making allowances for paying off all liabilities and the preferred stock at par, the assets, without taking into any consideration the item of good will, would equal over $120 per share on the $5,000,000 common stock.

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R-C-H Creditors Receive Dividend

DETROIT, MICH., Oct. 9—A fourth dividend of 10 per cent, representing about $34,000, is being mailed by the Security Trust Co., trustee, to the creditors of the old R-C-H Corp. This brings the total paid in dividends to about $312,500, and it is possible that a further dividend payment will be forthcoming later.

Automobile Securities Quotations on the New York and Detroit Exchanges

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Ajax-Grieb Rubber Co. com			300	..	..
Ajax-Grieb Rubber Co. pfd			101	..	..
Aluminum Castings pfd			..	..	..
J. I. Case pfd			78	81	—1
Chalmers Motor Co. com			151	156	+11
Chalmers Motor Co. pfd			98½	101	+ ½
Chevrolet Motor Co			104	108	..
Electric Storage Battery Co			70	74	—3
Firestone Tire & Rubber Co. com			575	..	+15
Firestone Tire & Rubber Co. pfd			112	..	..
General Motors Co. com			341	343	—7
General Motors Co. pfd			111	113	..
B. F. Goodrich Co. com			73½	75½	—3½
B. F. Goodrich Co. pfd			108½	109½	— ½
Goodyear Tire & Rubber Co. com			338	345	+3
Goodyear Tire & Rubber Co. pfd			108½	109½	— ½
Gray & Davis, Inc., pfd			..	..	..
International Motor Co. com			27½	29	—1½
International Motor Co. pfd			55	60	—3
Kelly-Springfield Tire Co. com			215	230	—5
Kelly-Springfield Tire Co. 1st pfd			90	92	+1
Kelly-Springfield Tire Co. 2d pfd			225	235	..
Maxwell Motor Co. com			55½	57	+2½
Maxwell Motor Co. 1st pfd			93	95	+1
Maxwell Motor Co. 2d pfd			46	48	+2
Miller Rubber Co. com			198	202	..
Miller Rubber Co. pfd			109	110	..
New Departure Mfg. Co. com			..	..	..
New Departure Mfg. Co. pfd			..	..	..
Packard Motor Car Co. com			139	143	+13
Packard Motor Car Co. pfd			101	..	+1
Paige-Detroit Motor Car			..	445	..
Peerless Motor Car Co. com			122	130	..
Peerless Motor Car Co. pfd			92	94	..
Portage Rubber Co. com			54	56	..
Portage Rubber Co. pfd			92	94	..
Regal Motor Co. pfd			..	21	..
*Reo Motor Truck Co			19½	21½	+1½
*Reo Motor Car Co			38½	40	+4
Splitdorf Electric Co. pfd			..	..	..

No quotations available at this time on account of war.

	1914 Bid	1914 Asked	1915 Bid	1915 Asked	Wk's Ch'ge
Stewart-Warner Speed. Corp. com			73	74	—3
Stewart-Warner Speed Corp. pfd			106	..	..
Studebaker Corp. com			142	143½	+2
Studebaker Corp. pfd			109	110	..
Swinehart Tire & Rubber Co			87	90	..
Texas Co.			167	169	+3
U. S. Rubber Co. com			53	55	—1
U. S. Rubber Co. 1st pfd			107	108	—1
Vacuum Oil Co			218	221	+7
White Co. pfd			110	..	..
Willys-Overland Co. com			231	233	+8
Willys-Overland Co. pfd			107½	108½	— ½

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

Chalmers Motor Co. com	..	97	157½	172½	+18
Chalmers Motor Co. pfd	..	..	97½	102½	..
Continental Motor Co. com	155	180	325	..	+30
Continental Motor Co. pfd	..	75	83½	90	..
General Motors Co. com	67	..	340	350	—5
General Motors Co. pfd	83	..	112	114	+1¼
Maxwell Motor Co. com	11	..	56	59	+3½
Maxwell Motor Co. 1st pfd	29	..	94	97	+3¾
Maxwell Motor Co. 2d pfd	..	..	47	49	+2¼
Packard Motor Car Co. com	..	..	137	155	+11
Packard Motor Car Co. pfd	90	94	100	..	..
Paige-Detroit Motor Car Co	..	..	..	450	+5
*Reo Motor Car Co	19⅜	20	37⅞	39	+2⅞
*Reo Motor Truck Co	..	11¼	19⅜	20	+1⅛
Studebaker Corp. com	..	..	143	145	+2¼
Studebaker Corp. pfd	..	..	..	120	+10

INACTIVE STOCKS

*Atlas Drop Forge Co	21	..	..	29	..
Ford Motor Co. of Canada	..	500	..	1550	..
Kelsey Wheel Co	..	..	205	..	..
*W. K. Prudden Co	..	20½	21	..	..
Regal Motor Car Co. pfd	25	..	..	21	..

*Par value $10; all others $100 par value.

11,000 Maxwell Cars in 2 Months

August and Sept. Earnings Estimated at 15% on Common Stock

DETROIT, MICH, Oct. 9—August and September earnings of the Maxwell Motor Co. are understood to have been better than 15 per cent on its $12,778,000 common stock, compared with 6½ per cent the previous year. The company for August and September delivered nearly 11,000 cars, or at the rate of better than 65,000 cars a year, which is substantially 100 per cent in excess of the production for the fiscal year to July 31.

Newcastle Plant a Unit

INDIANAPOLIS, IND., Oct. 8—After a little more than two years' operation as an independent enterprise, the Newcastle, Ind., plant of the Maxwell Motor Co., Detroit, Mich., again reverts to the parent company and will be operated as one of the units of the company itself. As is well known, the Newcastle plant has been largely devoted to the production of parts for Maxwell cars and replacements for products of several older companies that were merged in the Maxwell organization several years ago. For this purpose the Maxwell-Newcastle Manufacturing Co. was organized, which took over the plant under lease. The larger and growing demands of Maxwell car production at the present time, however, have necessitated a rearrangement in which is involved resumption of responsibility for the plant.

Ford Tractor Building to Be Enlarged

DETROIT, MICH., Oct. 11—The building upon the property of Henry Ford in Dearborn, near here, where the first Ford tractors were built, is to be greatly enlarged so that the building of experimental tractors on a large scale may be started. It is said that many changes will be made in the new demonstrators and that a long time will probably elapse before the final model for actual marketing purposes will be selected. It is also stated that the domonstrations given by the tractors at the recent Michigan State Fair led to many suggestions for their improvement.

Ford Buys More Indianapolis Land

INDIANAPOLIS, IND., Oct. 8—To increase its real estate holdings in Indianapolis for what is thought to be further development, the Ford Motor Co. has announced the purchase of ground immediately west of its plant on Southeastern Avenue.

The ground has 161 ft. frontage on Southeastern Avenue, is 270 ft. deep on the east side and 239 ft. on the west. The ground was purchased at different times from several different owners.

Attaches of the Ford branch are refusing to say at this time, what the ground is to be used for, except a general statement that it will be added to the Ford business. The present Ford building is unable to answer the demands of local business, although there is a square frontage of more than 200,000 sq. ft.

The Ford production for 1916 in the local branch will be more than 19,000 cars, and this will tax to the extreme the production facilities. However, it is safe to assume that this ground was acquired for building purposes and that a large addition is soon to be built to the Ford plant.

The idea of the Ford tractor is now obtaining shape, and the Ford agents are asking when this tractor will be available for selling. A. H. Smith, manager of the local Ford branch, refuses to say anything very definite as to when the Ford tractor will be announced. However, it is understood that these Ford tractors will be assembled in Indianapolis.

Norma Bearings Now Made in America

NEW YORK CITY, Oct. 9—The Norma Co. of America has started active manufacture of its ball bearings in this country. As early as 1912, the Norma company had anticipated the necessity for making its bearings in this country and a small shop was established for preliminary and experimental work. The results of these experiments were so successful that the shop activities of the company were gradually extended and the facilities enlarged, primarily with a view to meeting emergency demands where the imported bearings were not immediately available.

The outbreak of the war and the subsequent inability to obtain its goods from the plant at Cannstatt, Germany, promised to seriously affect the business of the company. Fortunately, however, the company was well stocked, which sufficed to tide over the situation until the American factory could be enlarged sufficiently to meet the demand. The company now has a completely equipped plant being steadily enlarged and increased in capacity.

S. A. Machine Co. Formed

DETROIT, MICH., Oct. 9—The S. A. Machine Co. has been formed by A. W. Sorensen, formerly president and general manager of the Trio Mfg. Co. and J. B. Allen, formerly of the Olds Motor Works, to make automobile parts and specialties. The plant is located at 518 E. Woodbridge Street.

New Overland Office Building

Will Be Seven Stories, 373 by 63 Ft.—Dodge Office Building Completed

TOLEDO, OHIO, Oct. 8—The old Overland administration building, formerly the Pope plant, is to be torn down to make room for a new factory structure. This latest addition to the production end of the business will compel the Willys-Overland Co., to vacate its present quarters and the entire office staff will be moved into a larger building as soon as it is completed.

The new office quarters will be located on Willys Park Boulevard. The building will be seven-stories high, 373 ft. long and 63 ft. wide. It will contain 165,000 sq. ft. of floorspace and will be made fireproof throughout.

McGraw Rubber to Open Factory Branches on Coast

EAST PALESTINE, OHIO, Oct. 11—The McGraw Tire & Rubber Co. will open direct factory branches on the Pacific Coast in San Francisco, Los Angeles and Portland, these to be under the district management of S. L. Warner, formerly superintendent of branches; C. K. Whittaker, formerly Kansas City manager, will be sales manager. C. H. Connelly, formerly Buffalo manager, will be in charge of the Kansas City branch; G. J. Marshall, formerly assistant branch manager in Buffalo, will take charge of the Kansas City branch; R. G. Nelson has been made superintendent of branches. At the annual meeting of the stockholders the officers and directors were re-elected.

To Build Cars in Pittsburgh

PITTSBURGH, PA., Oct. 9—A company formed by prominent local men and headed by E. E. Gregg, will build popular priced touring cars and roadsters in this city. Options have been secured on two plants said to have a yearly capacity of 10,000 cars. Production is scheduled to begin Jan. 1.

Dodge Administration Bldg. Completed

DETROIT, MICH., Oct. 7—The enlarged and rearranged administration building of Dodge Bros. was completed a few days ago. It is now one of the largest in the city, being a four-story structure, 80 by 400 ft. The first three floors are practically entirely taken up by offices, either for executives or for departments, such as the sales and advertising departments, which occupy most of the main floor. The fourth floor has the various dining rooms and rest and lounging rooms, there being one private din-

ing room for the Dodge brothers, a cafe for the executives and heads of departments, a cafeteria with room for 500 for the office employees, a smoking room and a large rest room for women.

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Detroit Commercial Car Co. in Pontiac Chassis Plant

PONTIAC, MICH., Oct. 7—The Detroit Commercial Car Co., which was recently organized in Detroit, to make the Detroit package delivery wagon, which is selling at $690 and $745, according to the style of body, will occupy part of the factory building of the Pontiac Chassis Co., which concern is making the chassis for the truck company.

According to President W. D. Paine, of the latter company, schedules have been laid out for an output of 5000 trucks the first year.

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Bowser Suit Against Wayne Oil Tank Withdrawn

FORT WAYNE, IND., Oct. 11—S. F. Bowser & Co., this city, has withdrawn its suit in the U. S. district court of Chicago, brought against the Wayne Oil Tank & Pump Co., also of this city, for alleged infringement on two patents on fill pipe caps. Both companies are manufacturers of gasoline and oil storage systems and fuel and oil dispensers. One patent in question involved the Red Sentry outfit, a sidewalk type of fuel dispenser. The other patent covered important features in wheeled pumps for serving gasoline to automobilists and for handling other volatile oils.

Judge Carpenter gave the Bowser company the option of answering some thirty interrogatories propounded by the defendant or withdrawing its suit.

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Wells Adds New Products

FOND DU LAC, Wis., Oct. 8—The R. C. Wells Mfg. Co., Fond du Lac, Wis., manufacturing the Wells starter-generator and other electrical devices for the motor car industry, is ready to market numerous new inventions, including a three-step dimmer switch which will be made in large quantities. The company also has contracts for 15,000 to 20,000 automatic fuel economizers to be delivered each month for the next six months. R. H. Mansfield, for many years with Cutler-Hammer Mfg. Co., Milwaukee, recently purchased the Wells company.

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Eight-Hour Day for Stewart-Warner

CHICAGO, ILL., Oct. 11—All the plants of the Stewart-Warner Speedometer Corp. were placed upon an 8-hr. basis, beginning last week, and rates were increased so that the men receive the same per day that they received under the previous 54-hr. schedule.

Carriage Factories May Build Cars

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$2,000,000 Canadian Co. May Enter Moderate-Priced Car Field in Spring

MONTREAL, QUE., Oct. 8—Carriage Factories may enter the automobile field. It is understood that very shortly Brockville will be selected for the manufacture of a light, moderate priced car, which will be ready for the trade next spring. The concern which is entirely a Canadian one, represents a consolidation of the principal Canadian companies manufacturing carriages and sleighs, including the Canadian Carriage Co., Brockville; Munroe & McIntosh of Alexandra; Tudhope Carriage Co. of Orillia and the Heney Carriage and Harness Co. of Montreal. These four companies are understood to produce about 75 per cent of the carriages, sleighs and light vehicles used in the Dominion of Canada. The company has an authorized capital of $2,000,000 common stock; $2,000,000, 7 per cent accumulative preferred stock and $1,000,000 first mortgage 6 per cent bonds. There is now outstanding $1,200,000 of preferred, $1,200,000 of the common, and $500,000 of the bonds. Directors of the company include, J. P. Tudhope, W. F. Brock, of the Royal Bank of Canada; W. F. Heney, W. J. Sheppard, director of the Royal Bank of Canada; J. A. MacKay, Hugo Munroe and T. J. Storey, president of the Atlas Motor Co., Brockville, Ont.

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Blowout at 86 M.P.H. Kills Tester on Indianapolis Speedway

INDIANAPOLIS, IND., Oct. 8—Albert Johnson, twenty-five, of Detroit, Mich., driver of a Packard test car, was fatally injured and his mechanician, Ross Robinson, twenty, was seriously hurt when the car traveling 86 m.p.h. turned turtle on the Indianapolis Motor Speedway, Monday afternoon, Oct. 4. Johnson died on the operating table at the Methodist Hospital Monday evening. Robinson may recover.

The accident occurred when the car blew a tire on the south turn into the back stretch of the track.

Robinson, Johnson and two other Packard experts have been at the speedway two weeks testing the Packard Twin Six which developed a high speed and they were making the last lap of a twenty-five mile spin when the car overturned. Coroner Poole investigated the accident and found Johnson's death was caused by shock following the accident.

The Packard experts had driven the car thousands of miles at the speedway and it was the object to give the car as much testing in a few weeks as an owner would give it in several years. Special attention had been given to the tires and the drivers were instructed to change tires whenever one showed any signs of wear. The tire that blew was on the right front wheel, the car turning over several times.

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Farmers See Cars at Western Washington Fair

PUYALLUP, WASH., Oct. 6—The Western Washington Fair held this year Sept. 28 to Oct 3 proved an excellent advertising medium for the Tacoma and Seattle automobile dealers, who occupied upward of twenty booths in the new automobile building on the grounds. While but few actual sales were made during the exhibition, considerable interest was manifested in the new models and the dealers were placed in touch with many of the small truck farmers, who will purchase cars this year in greater numbers than ever before.

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Two Killed in Columbus Race

COLUMBUS, OHIO, Oct. 11—Two fatal accidents occurred at the Columbus Driving Park, Oct. 10, when a 100-mile automobile race was run with a good field of cars entered. The accidents did not occur in the race but were the result of trial heats made to test a Stutz racing car. The car had been acting badly and driver Douglas Gray, 23, of Lima, and his mechanician, Clarence Robinson, colored, of Columbus, were both almost instantly killed when a tire blew on the front wheel and the car was overturned. The car was making about 50 m.p.h. when the tire burst and it was turned over twice.

Dr. Harry E. McCord, a practicing physician of Cincinnati, driving a Cino was declared a winner in 1 hr. 42 min. and 12 sec., but this was protested by Harry McNay, also in a Cino, who was said to have finished 9 sec. later. McNay protested that a mistake had been made in the signal system and that he was the winner. Until the dispute is settled the $1,000 prize money is withheld from any of the drivers.

In third place was Charles Mowery, of Loudenville in a Stutz, and fourth place went to W. G. Lake, of Mt. Vernon, in an Everitt.

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Marshall with Remington Arms

NEW YORK CITY, Oct. 13—W. C. Marshall, treasurer of the Metropolitan Section of the Society of Automobile Engineers, has taken a position in the production department of the Remington Arms Co., Bridgeport, Conn., and will resign from the governing committee of the section.

Service Assn. Scope Broadened

Indiana Managers to Include Repair and Distributing Heads—Plan National

INDIANAPOLIS, IND., Oct. 10—Members of the Indiana Automobile Service Managers' Assn. at their regular meeting at the Hotel Severin, Saturday afternoon, voted to include in the organization the service managers of repair and distributing agencies in addition to those of manufacturers and accessory houses. They heard a series of addresses on the purposes of the organization and discussed the probability of an early national organization into which the sectional agencies similar to Indiana organization will be incorporated.

To Meet Regularly

The Indiana organization will meet regularly on the second Saturday of October, January and April of each year, and each summer will have an outing. H. W. Drew of the Nordyke & Marmon Co., president of the Service Managers' Assn., in his opening address outlined the purpose of the organization.

A well-adjusted system of co-operation among all service agencies must be obtained, and in the furtherance of this the Indiana organization expects to do pioneer work, he said.

Four other papers were read, each of which was a report on some phase of the National Automobile Chamber of Commerce Service Managers' Convention in Detroit, Mich., last June. The papers were presented by O. W. Williams of the Inter-States Motor Co., Muncie, Ind., G. E. Drawe of the Pathfinder Motor Car Manufacturing Co., Indianapolis, J. O. Myers of the National Motor Vehicle Co., and E. W. Cotton of the McFarlan Motor Car Co., Connersville, Ind. Among the members from outside of Indianapolis who attended were: E. W. Cotton of the McFarlan Motor Car Co., and F. R. Leeds of the Lexington Howard Co., Connersville, G. B. Braithwaite of the Apperson Automobile Co., and H. R. Perry of the Haynes Automobile Co., Kokomo, R. J. Ellston of the Westcott Co., Richmond and J. H. Hopper of the Remy Electric Co., Anderson.

All local factories were represented at the meeting. The association will assist in a movement to standardize service policies.

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Safety Men Meet in Detroit

DETROIT, MICH., Oct. 12—The Safety First Federation of America will meet here in convention Oct. 19 and 20. More than 100 delegates from many states are expected, and many matters of direct interest to the automobilist will be considered. Among the men who are to address the convention are Henry B. Joy, president of the Packard Motor Car Co.; William McAdoo, chief magistrate of New York City; Job H. Lippincott, former commissioner of motor vehicles of New Jersey; Charles M. Talbot, director of streets, St. Louis; Harry P. Coffin, chairman of Public Safety Commission of Portland, Ore.; Alonzo P. Erwing, president of the Greater Detroit Safety First Organization; Ralph Folks, public welfare commissioner, New York; Charles C. Healy, superintendent of police, Chicago; John Gillespie, police commissioner, Detroit.

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Los Angeles Garagemen Busy Making Cars Into Speedsters

LOS ANGELES, CAL., Oct. 7—A new field has been opened up to the garagemen of Los Angeles by the craze for rebuilt cars which has taken southern California. The Ward Motor Car Co., which has opened a large garage at 1788-98 West Washington Street, is making a specialty of rebuilding. Used cars are cut down and transformed into speedster types. This garage handles a stock of accessories and supplies and does some general repairing, but the rebuilding is the main work of the corps of mechanics.

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U. S. L. Convention Oct. 12-15

NIAGARA FALLS, N. Y., Oct. 11—The annual convention of the United States Light and Heat Corp., this city, will fall on Oct. 12 to 15. The branch managers and salesmen from all sections of the country will be in attendance. Business sessions will be held and daily addresses by President J. Allen Smith, vice-president and general manager Harry Ackerman and sales manager, C. C. Bradford will be made. New sales and advertising policies will be explained to the visiting salesmen.

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Must Prove Chauffeur Negligent

LANSING, MICH., Oct. 9—The Supreme Court of Michigan has ruled that in cases of accidents to children, which occur on the streets, it must be plainly shown or proven that the chauffeur or automobile driver is negligent, before damages can be allowed the injured.

In the opinion written by Judge Steere, the latter says: "Drivers upon highways are not held as insurers against accidents arising from negligence of children or their parents, and though in law such negligence in a particular case may not be a defense as contributory negligence, for a driver also guilty of negligence, the fact of an accident does not establish liability or raise a presumption that the driver is negligent."

The ruling was made in the case of six-year old Orilla Barger, Detroit. She was struck by an automobile owned by Edward R. Russell on Gratiot Avenue, in 1911. In the Wayne County Court, a jury allowed the child, through her mother, $975 damages. An appeal was taken to the Supreme Court which now has sent the case back for a new trial, with the above mentioned ruling.

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National Safety Council to Meet in Philadelphia

PHILADELPHIA, PA., Oct. 13—The fourth annual safety congress of the National Safety Council will be held at the Bellevue-Stratford Hotel in this city on Oct. 19, 20 and 21. There is to be an elaborate exhibition of safety devices of all sorts, and special lectures will be delivered on the use of safety appliances in the various industries.

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Good Market for Light Cars in India

NEW YORK CITY, Oct. 9—There is a good market for light cars in India, according to a report given out by a local man. A reply, given him by a friend in India who had been asked for information in regard to the sale of automobiles in that country, stated that there are already many light cars in that country and that it is probable that a good market could be made there for the right car at the right place. It would be used daily for journeys between the bungalow, club and office.

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20,555 Cars in Virginia

RICHMOND, VA., Oct. 9—From 4020 automobile licenses issued by the Secretary of the Commonwealth for the year 1911, netting a revenue of $40,000, the number of license taxes sold has increased to 20,555 for the nine months of 1915, with a revenue of $170,000, all of which goes to the State Highway Commission for road improvement. Including the revenue from 1911 to date the State has received more than $479,000 from the sale of license tags to automobiles.

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Wisconsin Association Improves Laws

MILWAUKEE, WIS., Oct. 9—The Wisconsin State Automobile Association spent $465 at the 1915 session of the Wisconsin Legislature. The association succeeded in retaining the former excellent automobile code on the statute books, besides adding several amendments to increase the safety of motoring.

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Highway Engineering in U. of M.

ANN ARBOR, MICH., Oct. 9—A graduate fellowship to be known as the R. D. Chapin Fellowship in Highway Engineering has been given to the University of Michigan by Roy D. Chapin, president of the Hudson Motor Car Co. The fund donated provides an annual payment of $500.

Factory Miscellany

Tulsa Co. to Make Oils—Cosden & Co., Tulsa, Okla., J. S. Cosden, president, will build a plant costing $200,000 for manufacturing wax, automobile oils and cylinder oils.

Miles Co. Making Trailers—The Miles Mfg. Co., 306 East Franklin Street, Jackson, Mich., which has been making concrete machinery is now also making the Miles automobile trailer.

Beardsley's New Plant—The Beardsley Electric Co. will build a plant at Culver City, Cal., near Los Angeles, to make electric passenger cars.

Motor Specialties Adds—A new boiler room, 50 by 60 ft., and a machine shop are being erected for the Motor Specialties Co., Muskegon, Mich., the expenditure on the buildings being estimated at $10,000.

Sterling Truck to Aid—The Sterling Motor Truck Co. Forty-sixth Avenue and Rogers Street, West Allis, Milwaukee, has awarded contracts for a factory addition which will practically double its capacity.

Carriage Co. to Make Automobiles—The Cortland Cart & Carriage Co., Sidney, N. Y., increased its capitalization from $75,000 to $225,000 to take up the manufacture of automobiles. It expects to continue its carriage business as usual.

To Make Sight Feed Oilers—Harvey Strong and L. C. Perkins of the Des Moines Fuel & Lime Co., has organized the Perkins Mfg. Co., for the manufacture of a sight feed oiler for Ford cars. They have established a plant at 51 Mulberry Street, Des Moines. The initial order is for 50,000 oilers to Zinke & Co., Chicago, Ill.

Detroit Welding Opens New Shop—The Detroit Welding Co., which started in business eighteen months ago at Leib and Larned Streets, Detroit, Mich., has opened a new shop at 814 West Jefferson Avenue. The shop is fitted out to take care of welding of cast iron, aluminum steel, brass, brake rods, steel tanks, and do general welding work.

Allen Dedicates New Plant—The new plant of the Allen Motor Co., Fostoria, Ohio, has been completed. The new structure, composed of concrete and steel, covers a floorspace of 150 by 100 ft. It will be used for the testing of Allen-Sommer motors. With the completion of this plant the annual output of motors is expected to be tripled.

Aluminum Castings New Building—The new machine shop of the Aluminum Castings Co., Detroit, Mich., is now complete and in use. It is 176 by 105 ft. The company is now making a specialty of the machining of bronze bushings from any one of its forty to fifty Lynux alloys, and also to handle a large quantity of bronze back babbitt lined bearing work.

Hancock Co. Rushed—The Hancock Mfg. Co., which makes parts and now has 130 men on its payroll, is working nights three days a week till 9 o'clock, being unable to turn out orders on schedule by working by day only. Orders on the books now will keep the plant busy all winter. Although a large addition was put up this summer a further extension may be necessary.

To Make Tires in San Jose—A tire plant employing 800 to 1000 men will be established in San Jose, Cal., by the Aero-Cushion Tire Co. The plant will be established on a site near the corner of First and Maple Streets. It is expected that the company will be turning out tires within ninety days. The tire itself is made up of 65 per cent porous rubber, 30 per cent air and 5 per cent of chemicals. It is placed inside the casings, and, it is claimed, practically indestructible.

Auto Wheel Triples Production—Since last April the Auto Wheel Co., Lansing, Mich., has almost tripled its production capacity through the erection of an addition, 60 by 180 ft., partly two stories high, a new boiler room, ten new dry kilns, a large hydraulic hub press, new boilers and other additions. At that time about fifty men were employed, while now more than 150 are on the pay roll. The daily output is now forty sets of truck wheels and 225 sets of other automobile wheels. Orders on hand are said to enable the company to keep the plant busy for the next twelve months.

The Automobile Calendar

Oct. 6-16.....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Oct. 11-16.....Kansas City Dealers' Tour.
Oct. 16.....Chicago, Ill., 350-Mile Race, Chicago Speedway.
Oct. 16-23.....Pittsburgh, Pa., Show, Motor Square Garden, Automobile Dealers' Assn.
Oct. 17.....Twin City Speedway Match Race.
Oct. 18-19.....Cleveland, O., Hotel Statler, Sixth Annual Convention, Electric Vehicle Assn. of America.
Oct. 18-24.....Troy, N. Y., Show, State Armory, Troy Automobile Dealer's Assn.
Oct. 18-25.....Los Angeles, Cal., Broadway Automobile and Flower Show, Automobile Dealers' Assn.
Oct. 20-21-22.....Excelsior Springs, Mo., National Assn. of Automobile Accessory Jobbers' Meeting.
Oct. 21.....New York City, Met. Sec. S. A. E. Meeting at Automobile Club of America.
Oct. 24.....Fort Worth, Texas, Race Meet.
Oct. 25-27.....Columbus, O., Garage Owners' Convention.
Oct. 29.....Indianapolis, Ind., Claypool Hotel, S. A. E. Meeting of Ind. Section.
Nov. 1-3.....Pasadena, Cal., Show, Hotel Green, Walter Hempel.
Nov. 2.....New York City, Sheepshead Bay Speedway, 100-Mile Race.
Nov. 12-20.....Providence, R. I., Show, State Armory, Rhode Island Automobile Dealers' Assn.
Nov. 18.....Arizona 150-mile Grand Prix.
Nov. 29-Dec. 4....Electric Prosperity Week.
Dec. 31-Jan. 8....New York City, Sixteenth Annual National Automobile Show; Grand Central Palace; National Automobile Chamber of Commerce.

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Jan. 8-15.....Cleveland, Ohio, Show, Wigmore Coliseum, Cleveland Automobile Show Co.
Jan. 8-15.....Philadelphia, Pa., Philadelphia Auto. Trade Assn.
Jan. 22-29.....Chicago, Ill., Show, National Automobile Chamber of Commerce; Coliseum and First Regiment Armory.
Jan. 24-29.....Buffalo, N. Y., Show, Buffalo Automobile Dealers' Assn., Broadway Auditorium.
Jan. 29-Feb. 5....Minneapolis, Minn., Show, National Guard Armory, Minneapolis Trade Assn.
Feb. 7-12.....Kansas City, Mo., Show, Convention Hall, Kansas City Motor Dealers' Assn.
Feb. 14.....Des Moines, Ia., Show, Des Moines Auto. Dealers' Assn.
Feb. 15-20.....Omaha, Neb., Show, Omaha Automobile Show Assn.
Feb. 19.....Newark, N. J., Show.
March 4-11.....Boston, Mass., Truck Show, Mechanics Bldg.
May 13.....New York City, Sheepshead Bay Speedway Race.
May 30.....Indianapolis Track Race.
June 17.....Chicago Track Race.
June 28.....Des Moines, Ia., Track Race.
July 4.....Minneapolis Track Race.
July 4.....Sioux City Track Race.
July 15.....Omaha, Neb., Track Race.
Aug. 5.....Tacoma Track Race.
Aug. 18-19.....Elgin Road Race.
Sept. 4.....Des Moines Track Meet.
Sept. 15.....Indianapolis Track Race.
Sept. 16.....Providence Track Race.
Sept. 30.....New York City Sheepshead Bay Race.
Oct 7.....Omaha Track Race.
Oct. 14.....Chicago Track Race.

The Week in the Industry

Langworthy Resigns—M. B. Langworthy has resigned as president of the King Motor Sales Co. of New York, Buffalo, N. Y.

Grady Succeeds Bush—J. E. Grady has succeeded W. T. Bush as general sales manager of the Studebaker Corp. of Canada. He will devote all his time to the retail trade.

McKenny Resigns—J. A. McKenny has resigned his position with the Dayton Buick Co., Dayton, Ohio, to become sales manager of the Standard Motor Car Co., Dayton, agent for the Chalmers.

Swinehart Tire Moves—The Swinehart Tire & Rubber Co. branch at Boston, Mass., has moved into its new quarters at 62 Brookline Avenue.

Robinson Makes Change—Percy Robinson, formerly manager of the Moline Knight branch in Boston, Mass., has resigned to join the sales force of the Premier and Westcott cars in that city.

Sowers Reno Mgr.—Cuyler Lee, distributer of the Maxwell and Packard lines in California, has opened a branch establishment in Reno, Nev., and has appointed George Sowers as manager.

Royce Louisville Tire Mgr.—The American Tire Co., distributor for the American tire, has opened a salesroom at 525 South Third Street, Louisville, Ky. J. W. Royce is manager of the concern.

Promotion for Flinn—C. W. Flinn, for the past year identified with the Chevrolet Motor Co. of New England at the Boston, Mass., branch, has been promoted to be manager of the company's branch at Stamford, Conn.

White Joins Curtiss—H. C. White has accepted a position with the Curtiss Aeroplane Co. as production engineer. He was formerly connected with the Pierce-Arrow Motor Car Co. as superintendent of the assembling departments.

Dealer

New Baltimore Tire Co.—The Gilson Sales Co., 213-215 Guilford Avenue, Baltimore, has become the Maryland distributor for the tires of the Canvas Tread Tire Co., Utica, N. Y.

Free Tire Service in Dayton—The Free Tire Service Co. is the name of a new concern, opened at 208 West Third Street, Dayton, Ohio. C. R. Connor, formerly of Huntington, W. Va., and O. R. Rowe compose the firm. Free tire service will be given to owners within a radius of 5 miles from Dayton.

Motor Men in New Roles

Mathews Mohawk Tire Sales Mgr.—C. C. Mathews, formerly with the United States Tire Co., has taken on the representation of the Mohawk tire, and will handle the sales in the southern part of Indiana, with headquarters at Evansville.

Boland Is Expanding—H. M. Boland, Worcester, Mass., agent for the Hupmobile and proprietor of the Kelly-Springfield Tire Co., has bought out also the Forer & Danziger Co., that had the Johns-Manville service station at 703 Main Street.

Herron Joins Springfield Body—Murray Herron has joined the Springfield Metal Body Co., Springfield, Mass., in the capacity of comptroller. He was formerly a branch and service manager in Detroit for the Stewart-Warner Speedometer Corp.

Allan Burd District Branch Mgr.—Robert Allan has been appointed district branch manager for northern California by the Burd High Compression Ring Co., Rockford, Ill. His headquarters will be at San Francisco, at 847 Phelan Building.

Avery Packard Service Head—L. C. Avery has been appointed technical manager of the Packard-Cleveland Motor Co., Cleveland, Ohio, succeeding A. P. Welburn, who has returned to Boston. J. J. McCauley, former assistant to Mr. Welburn, has been promoted to the Packard truck sales department.

Schaefer with Goodyear—W. H. Schaefer, who was a member of the truck specification department of the Packard Motor Car Co. for the past three years, is now with the sales department of the Goodyear Tire & Rubber Co., Akron, Ohio, where he will give special attention to the foreign business of that concern.

Andress Heads Cleveland Truck Agency—H. D. Andress, formerly division sales manager of the Chase Motor Truck Co., Syracuse, N. Y., has been appointed general manager of the Safe Motor Sales Co., 6504-06 Euclid Avenue, Cleveland. This company handles the Vim light delivery car, the Chase truck and the Simplex trailer.

Bolland Made Pres.—J. B. Bolland of St. Louis has been made president and general manager of the Bittel-Leftwich Service Co., Springfield, Ill. He succeeds A. Turner, who has been transferred to St. Louis to take up a new berth with the same firm in that city. The company will handle automobile supplies and accessories of all kinds.

Boston Dodge Enlarges Organization—The Henshaw Motor Co., Boston Dodge distributor, has materially enlarged its organization. The additions include W. L. Shepard, formerly treasurer Shepard Mfg. Co., Melrose; W. A. Maynard, formerly Chalmers dealer in New Haven, Conn.; T. A. Guild, I. W. Sibley, F. W. Bailey, F. H. Lewis and E. A. Walker.

Duffy Heads N. Y. Standard—S. G. Duffy is president and L. J. Goldman vice-president of the Duffy Motors Corp., 1895 Broadway, New York City, to handle the Standard Eight in that city.

Schiller on Pacific Coast—J. P. Schiller, Jr., has been sent to the Pacific Northwest as special service representative of the Willard Storage Battery Co., Cleveland, Ohio. He will make his headquarters in Seattle.

Wicks Heads Milwaukee Westinghouse—The Westinghouse Lamp Co., New York, on Oct. 15 started operation in its new Western lamp works at Milwaukee, where a maximum output of 500,000 globes per month is ultimately planned. The company has previously operated large works at Bloomfield, N. J., and New York City, but has long felt the need of a large plant in the Middle West. Accordingly, the company purchased the former Milwaukee plant of the Kissel Motor Car Co., Hartford, Wis., at Thirty-first and Center Streets, and since then has been equipping it for the production of lamps of all voltages and sizes. Five hundred girls are employed at Milwaukee. F. W. Wicks, formerly of the New York plant, is general manager at Milwaukee.

Dealer

Holtzer-Cabot Offices Moved—The executive offices and factory of the Holtzer-Cabot Electric Co., Boston, formerly located in Brookline, together with the Boston factories of the company, have just been removed into the company's new plant in Roxbury, Mass.

Cleveland Overland Leases—The Overland-Cleveland Co., 6604 Euclid Avenue, Cleveland, Ohio, branch distributor for the Overland company, has purchased the 99-year lease on an extensive piece of land in the immediate rear of the sales and service station. The property has 95 ft. frontage on Carnegie Avenue, extending 584 ft. deep.